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FEDERAL-GRANT RESEARCH
at the
STATE AGRICULTURAL
EXPERIMENT STATIONS

Projects on
FORAGE CROPS, PASTURES, AND RANGES
Section 10

Agricultural Research Service
UNITED STATES DEPARTMENT OF AGRICULTURE

Compiled May 1958 by

The State Experiment Stations Division, Agricultural Research Service, U. S. Department of Agriculture, Washington 25, D. C., for use of workers in agricultural research in the subject-matter areas presented. For information on specific research projects write to the Director of the Station where the research is being conducted.

Issued July 1958

FEDERAL-GRANT RESEARCH

at the

STATE AGRICULTURAL EXPERIMENT STATIONS

Projects on

FORAGE CROPS, PASTURES, AND RANGES

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INTRODUCTION

This compilation is one of a series providing information on Federal-grant-supported research at the State agricultural experiment stations. It is prepared for use by research workers in the subject-matter areas presented. Only that part of each State's research program supported by Federal-grant moneys is included.

In addition to the Federal-grant moneys, which are appropriated annually by the Congress, the State experiment stations also receive some Federal support through cooperative agreements or contracts with the U. S. Department of Agriculture. Information on such research, along with other Departmental Research, is available in the Central Project Office, Agricultural Research Service.

A substantial part of each State agricultural experiment station's research is supported with moneys appropriated by the respective State or Territorial Legislatures and through other forms of private and public financing. Information on current agricultural research at the stations which is not financed under the Federal-grant program or through USDA cooperation can be obtained only from experiment station directors or persons authorized by them to give out such information.

The information given in the series of Federal-grant summaries includes the title and objectives of each Federal-grant project pertaining to the subject given on the cover. The identification of each project gives the department(s) conducting the research, the station number of the project, and the number of the regional project if it is a contributing project.

Relevant regional projects and the titles of contributing State projects appear at the end of each major subject group. The States are grouped into four major regions. These regions are designated NC - North Central, NE - Northeastern, S - Southern, and W - Western. The capital letter "M" following the letters for the region indicates regional marketing projects. Contributing projects are listed by States. The Roman numeral (and capital letter) refer to the location in the summary of the contributing project title and objectives.

FORAGE CROPS, PASTURES AND RANGES

I. FORAGE CROPS BREEDING AND VARIETY TESTING

A. General

Ala. Adaptation of Forage Crops to Alabama Conditions. To determine species and varieties of crops or combination of these that are best adapted for production of forage in different soil and climatic areas of Alabama.
Agron. and Soils 538

Alaska Breeding Superior Forage Varieties for Alaska. Develop forage crop varieties sufficiently cold resistant to survive Alaska winters and capable of producing high quality forage; to produce foundation seed of improved varieties.
Agron. 40

Ark. The Improvement of Alfalfa and Annual Lespedeza. Develop (1) high forage yielding varieties of pasture- and hay-type alfalfas resistant to insects and diseases and tolerant to high rainfall and poorly drained soils, and to grazing; (2) high forage and seed yielding strains of annual lespedeza resistant to diseases and of adapted maturity; (3) conduct variety and strain tests of alfalfa and annual lespedezas on state and regional level to provide a basis for making varietal recommendations and to provide breeding material and/or improved strains for testing in other sections of region.
Agron. 136 (S-12)

Ark. Pasture Species Evaluation in Arkansas. To (1) evaluate and develop methods of pasture establishment and stand maintenance; (2) learn effects of frequency and height of clippings on forage yields and species balance; (3) evaluate pasture species and species combinations with respect to adaptation, species competition, length of growing period, and seasonal forage production under different fertilizer and irrigation practices; (4) evaluate winter and summer supplemental pasture species in a pasture forage program.
Agron. 460

Ga. The Introduction, Testing and Improvement of Forage and Pasture Plants. To secure, test, and select strains of forage and pasture crops better adapted to Georgia conditions.
Forage, Pl. Path., Agron. 39. Coop. ARS

Ga. The Improvement of Tall Fescue Grass and White Clover Through Breeding and Selection. To (1) investigate compatability of interspecific Festuca crosses & inter generic Festuca-Lolium crosses, & learn relative value of any progenies obtained; (2) maintain genetic stocks of fescue & white clover & obtain data on breeding behavior; (3) evaluate spaced plants of white clover & fescue relative to differences in forage & seed production, persistence, disease reaction, animal preferability, & nutritive value; (4) combine selected clones or hybrids of fescue & white clover into synthetics & evaluate combinations as strains for release in South; (5) evaluate available varieties, strains, & ecotypes of fescue & white clover.
Agron., Anim. Indus., Pl. Path. 41 (S-12)

Hawaii Agronomic Crops: Adaptability, Breeding and Cultural Studies. (1) Learn most suitable crops for soiling; relative merits of certain grasses & legumes for pastures & develop superior strains of forage crops by selecting & breeding. (2) Select or develop high yielding, high starch content varieties of sweet potatoes for animal & human consumption during food shortages; with cooperative growers test selected varieties under various weather conditions.
Agron. 103

Idaho Production and Breeding of Forage Crops Under Irrigated and Dryland Conditions. To (1) evaluate new species of forage crops for possible use as parent materials; (2) breed forage crops, especially Bromus, Dactylis, & Agropyron, to develop varieties of these species & of others as conditions demand, for use on irrigated lands, abandoned crop land, & range reseeding; & (3) investigate relative merits of different methods of establishing & maintaining stands of grasses & legumes under irrigated, dryland & range conditions.
Agron. 263. Coop. SCS

Idaho Evaluation of Forage Species and Seedbed Preparation of Southern Idaho Dry Land Pastures and Ranges. To evaluate forage species & varieties under varying climatic conditions & soil types in the dry lands of Southern Idaho (non-saline soils of sagebrush-grass association & the saline soils of the salt-desert shrub association), & to learn the most desirable time of seeding & methods of seedbed preparation for revegetating dry land pastures & ranges.
Agron. 277. Coop. SCS

Ind. Evaluation of Legume and Grass Introductions. Evaluate, summarize, & distribute to interested personnel the data on alfalfa, red clover, & cool season grasses & make any superior plants obtained available for breeding programs in the region.
Agron., Bot., Pl. Path. 890 (NC-7)

Iowa Adaptation of Species and Varieties of Forage Crops to Soil and Climatic Differences in Iowa. To learn (1) specific response of varieties & species of forage crops to several edaphic & climatic factors; (2) most suitable association of perennial grasses & legumes from standpoint of competition for survival, seasonal distribution of dry matter production, & forage quality; & (3) optimum seeding rates of grass & legume mixtures.
Farm Crops, Soils, Agron. 1122

Kans. Multiplication, Preservation, and Determination of Potential Value of Forage Grasses and Legumes. To make preliminary appraisal of grasses and legumes useful for forage, soil conservation, and other purposes, and to preserve seed or vegetative parts of plants having potential value in forage plant breeding programs in the central Great Plains.
Agron. 287 (NC-7) Coop. ARS, SCS

Kans. Pasture Crop Breeding, Testing, and Evaluating. To breed new varieties of pasture crops and evaluate them with respect to yield and quality of forage, seed production, competitive capacity in mixtures, and adaptability to climatic and soil conditions.
Agron. 310. Coop. ARS

Kans. Forage Legume Improvement Through Breeding. Improvement of forage legumes, other than alfalfa, for range & pasture in Kansas.
Agron. 429

Ky. Evaluating and Breeding Forage Crops. To (1) evaluate species & varieties of forage crops obtained thru introduction, naturalization & breeding; & (2) breed improved varieties of tall fescue, Kentucky bluegrass, & red clover.
Agron. 160 (S-12) Coop. ARS

Ky. Introduction, Multiplication, Preservation, and Determination of Potential Value of New Plants and Plant Species for Industrial and Other Purposes, and for the Preservation of Valuable Germplasm of Economic Plants. To (1) introduce species & varieties of plants into Kentucky which are considered to have possible agricultural value; (2) multiply and evaluate introduced plants as new crops, as sources of new germplasm in crop improvement, & for possible new uses; (3) evaluate any native plants which may have potential value to Kentucky agriculture; & (4) preserve varieties & species of economic plants which have valuable germplasm.
Agron. 166 (S-9)

La. The Evaluation and Management of New Species, Varieties, and Strains of Forages and Pasture Crops. (1) Evaluate new & improved species, varieties, & strains adapted to Southern region, & observe new plant introductions obtained thru Southern Regional Plant Introduction Section. (2) Study response of better adapted grasses, legumes & grass-legume mixtures, to different management practices.
Agron. 558 (S-12)

Maine Breeding and Evaluation of Forage Crops. To (1) develop by hybridization & selection improved strains of forage grasses & legumes adapted to Maine conditions; (2) secure & evaluate clonal material & seed progenies from old established stands of forages; (3) evaluate material developed by breeding program as well as forage plants, clones, lines, etc., from other sources for total yield, seasonal distribution of yield, persistence, winter hardiness, etc.; & (4) evaluate forage performance of various grass & legume combinations under different management systems.
Agron. 34

Mass. Performance of New and Standard Forage Species and Varieties. (1) Establish plots of new & standard forage species & varieties so to evaluate performance of recently developed & introduced material. (2) Evaluate these species under various levels of fertility. (3) Learn ability of perennial forage species to persist with controlled grazing.
Agron. 13

Mass. Breeding and Evaluation of Improved Varieties of Forage Crops Adapted to the Northeast. Learn establishment, persistence, & productivity of regionally developed experimental synthetics of alfalfa, birdsfoot trefoil, Ladino clover, smooth bromegrass, orchard grass, & timothy. (2) Compare performance & characteristics of new experimental synthetics to standard varieties in use in the Northeast to learn their regional adaptation & areas of use. (3) Evaluate these varieties & synthetics on basis of response to fertility. (4) Learn the ability of these species to persist under controlled grazing management.
Agron. 143 (NE-28)

Minn. Forage Crop Production and Management. -- 4. Observation Testing of New Species of Legumes and Grasses. To determine best techniques in establishment & management of grasses & legumes for pasture & hay.
Agron., Pl. Genet., Soils, Anim. & Dairy Husb. 1302-4. Coop. SCS

Miss. Forage and Pasture Crop Breeding. To collect, introduce, isolate by selection, or to develop by hybridization, superior Dallisgrass, Johnsongrass, sorghum x Johnsongrass segregates, ryegrass, & crimson clover for the South.
HC-2, RRFC-1 (S-12) Coop. ARS

Miss. Development of Improved Varieties of Silage Crops. To introduce, isolate by selection, or develop by hybridization and selection superior varieties of crops for soiling and silage.
Agron., Crops HC-17

Miss. Development, Improvement, and Standardization of Techniques and Methods for Evaluating Seedling Vigor. (1) Develop, improve, & standardize techniques for evaluating seedling vigor. (2) Correlate evaluations obtained thru use of techniques developed under Objective 1 with true stand-producing potential of seed, under favorable and unfavorable conditions.
Field Crops HSP-3

Mo. Testing Species and Varieties of Grasses and Legumes for Use in Pastures. To compare new species and varieties of forage grasses and legumes made available by plant introduction and by plant breeding with species and varieties now in use to determine their value for pasture, hay, and grass silage in different climatic regions and on different soils in Missouri.
Field Crops 220. Coop. ARS

Nebr. Improvement of Forage Grasses and of Grasslands. To (1) increase productivity, nutritive qualities, vigor & longevity of forage grasses thru breeding & selection; (2) evaluate, thru nursery & field trials, many species & strains as to forage qualities, productivity, & adaptation to Nebraska; (3) develop better methods of procuring, harvesting, & processing grass seeds, especially seed of important native grasses, so that seed supplies may be available in sufficient quantities & in condition that will permit easy planting with common farm machinery; & (4) determine best cultural practices for establishment of grasses & legumes for pasture, meadow, conservation purposes, & turf.
Agron. 227. Coop. ARS

Nev. Evaluation of Agronomic Plants in Different Locations in Nevada. To learn effect of environment on productivity & quality of species & varieties of forage crops, small grains, & oil & fiber crops.
Agron., Range Mgt., Agr. Chem., Anim. Husb. 32. Coop. ARS

N. H. Improvement of Smooth Bromegrass, Red Clover, and Alfalfa. (1) Develop an improved variety of smooth bromegrass with resistance to brown leaf spot (*Pyrenophora bromi*), better summer production, & greater leafiness & vigor. (2) Test alfalfa, bromegrass, & red clover for persistence & adaptation.
Agron. 116

N. J. Genetics and Breeding of Forage Legumes. (1) Study genetic characteristics of various forage legumes grown in Northeast. (2) Learn mode of inheritance of characters studied. (3) Relate observed genetic behavior of species to methods which might be used for their improvement.
Farm Crops 226 (NE-28)

N. J. Evaluation of Forage Strains and Varieties. (1) Study agronomic characteristics of newly developed or newly introduced strains & varieties of forage crops. (2) Relate observed performance of new materials to that of standard strains. (3) Advise farmers and agricultural organizations as to merits of strains & varieties on basis of their performance. (4) Search for new & unusual types of forage plants useful in related genetic studies.
Farm Crops, Pl. Path., Ent. 246. Coop. ARS

N. Mex. The Preliminary Testing and Evaluation of New Foreign and Native Plants of Potential Value for Oil, Protein, and Leguminous Forage. To (1) learn their adaptability, seed and/or forage yields, & other agronomic characteristics; (2) evaluate by chemical analysis seeds & other parts of new plants to learn their value as potential sources of oil, protein, & leguminous forage; & (3) maintain supplies of viable seed of the evaluated plants.
Agron. 43 (W-6) Coop. ARS

N. Y. (Cornell) Breeding and Cytogenetic Investigations with the Forage Plants of New York. To develop improved varieties of forage crops adapted to New York agriculture which will include: alfalfa; red clover, Ladino clover; zigzag clover; alfalfa, clover & grass introduction nursery; clover & trefoil interspecific hybridization; bromegrass; orchard grass; timothy; reed canary grass; & tall oatgrass.
Bot., Agron., Ent., Pl. Path., Pl. Brdg. 118 (NE-28) Coop. ARS

N. Y. (Cornell) Breeding and Evaluation of Improved Varieties of Forage Crops Adapted to Northeast. To (1) learn establishment, persistence, & productivity of regionally developed clones, their progeny, & experimental synthetic varieties bred from them of alfalfa, birdsfoot trefoil, Ladino, smooth bromegrass, orchard grass, timothy, & others under and soil & climatic conditions of N. Y., (2) relate above performance data to observable morphological & physiological characteristics of selection & establish selection criteria, (3) use data in determining methods for formulation of regionally adapted synthetic varieties, (4) compare performance & characteristics of strains among themselves & with standard check varieties, (5) cooperate in regional testing under Project NE-28.
Forage 122-1 (NE-28) Coop. ARS

N. Dak. Evaluation of Forage Crop Species. To (1) compare & evaluate grass & legume species & determine their value for forage or other uses for this northern region; & (2) increase foundation seed of promising new lines, making them available for farm production.
Agron. 6-3

N. Dak. Coordination and Supervision of Agronomic Research Projects in North Dakota. To coordinate & supervise field plot experiments in various places of North Dakota where soil & climate differ from that at the Central Station, Fargo.
Agron. 6-5

Ohio Evaluation of New and Standard Strains of Forage Crops. To (1) evaluate new strains and selections of forages as they are developed and made available by plant breeders at other stations; (2) determine comparative yields, recovery from cutting, distribution of seasonal growth, resistance to disease, soil, and climatic adaptation of available strains of different species of forage crops; (3) conduct preliminary tests of new forage species or introductions that may become available.
Agron., Ent. 101

Okla. Testing Pasture Plants for Yield and Region of Adaptation. To (1) develop methods of establishing uniform stands on pasture plants in test plots; (2) determine geographic range of adaptation of pasture plants showing promise in the breeding program; & (3) evaluate pasture plants showing promise in preliminary tests for yield, recovery from clipping, persistence, & chemical composition.
Agron., Chem. 785 (S-12) Coop. ARS

Pa. Genetic, Cytological, and Physiological Factors Involved in Hybrid Sterility. To assay some of the possible factors that may be involved in the breakdown of the normal chromosome mechanisms in sterile hybrids.
Bot., Pl. Path. 1215-A

Pa. The Introduction and Evaluation of Forage Crops Breeding Stocks. Obtain & evaluate (1) source materials possessing potentially valuable germplasm for incorporation into existing forage crops breeding programs; (2) source materials of forage species which are not currently used for forage in Pennsylvania.
Agron. 1301 (NE-9)

Pa. Determination of Seed Quality and Varietal Purity and Identity of Seeds of Improved Strains of Alfalfa, Red Clover, Birdsfoot Trefoil, and Orchard Grass. (1) Make field test for purity & identity of seed lots of alfalfa, red clover, birdsfoot trefoil, etc. (provided thru planning committee of NEM-22). (2) Correlate findings from above with those obtained from field trials conducted in other states using same seed lots, & with findings obtained from lab., greenhouse, & controlled climatic chamber analyses conducted at Geneva, New York.
Agron. 1345 (NEM-22)

P. R. Introduction and Evaluation of New Plants for Industrial and Other Purposes, and the Preservation of Valuable Germplasm of Economic Plants. To introduce economically important plants, evaluate them as sources of food and industrial use and as new germplasm for crop improvement, and evaluate usefulness of some native species.
Pl. Brdg. 94 (S-9) Coop. ARS

R. I. Evaluation of Varietal Purity and Identity of Seeds of Improved Strains of Alfalfa, Red Clover, and Birdsfoot Trefoil Recommended or Developed in the Northeast. (1) Test under field conditions for varietal purity & identity, lots of alfalfa, red clover & birdsfoot trefoil seed. (2) Learn by comparison with field trials conducted in other states & with lab., greenhouse, & climate chamber tests conducted at Geneva Experiment Station [N. Y.], the influence of ecological & other environmental factors on expression of varietal characteristics of pedigreed & commercial stocks of forage crop seed.
Agron. M-217 (NEM-22)

S. Dak. The Breeding and Testing of Forage Legumes. To (1) develop by breeding & introduction new strains of forage legumes possessing: a. capacity to persist & thrive under grazing conditions & in association with other plants; b. superior vigor in themselves & capacity to stimulate growth of grasses grown in association; c. resistance to foliar & systemic diseases & to insect pests; & d. physical & chemical qualities acceptable & beneficial to livestock; (2) study genotypic & cytologic behavior & environmental factors affecting the expression of characteristics sought under objective 1, viz: a. determine genetic & environmental variances & covariance affecting vigor, persistence, & survival of alfalfa clones, in different populations, at different gene frequencies, & under different conditions as to soil & climatic factors; b. study relationship of chromosome number & association to breeding behavior in alfalfa; & c. investigate genetic nature of reaction to systemic & foliar diseases; (3) appraise newly developed strains for adaptability to various environmental conditions of the state; & (4) cooperate with neighboring experiment stations & USDA by participating in conferences & exchanging material freely in regional forage improvement program.
Agron. 74

S. Dak. The Evaluation of Forage Legumes and Grasses for Adaptation to the North Central Region. To evaluate grass & legume introductions to determine sources of drought resistance, winter hardiness, & disease resistance.
Agron. 297 (NC-7)

Tenn. *Evaluation of the Performance of Varieties of Field Crops*. (1) Learn performance of field crop varieties in important agricultural regions. (2) Evaluate performance data and make varietal recommendations. (3) Disseminate information concerning field crop varieties to farmers and agricultural leaders.

Agron. 33. Coop. USDA

Tex. *Evaluation and Improvement of Legumes*. To (1) collect native and introduced legumes and learn their adaptation to the various climatic and soil conditions of the state; (2) select plants or strains possessing combinations of desired characteristics such as forage and seed yield, forage quality, palatability, stand longevity, resistance to diseases, insects and drought, ability to grow successfully with other species, winter hardiness, seasonal growth, and vigor of recovery after defoliation; (3) study response of legumes to different fertility levels; (4) combine by breeding methods into a single plant or strain as many superior traits as possible; (5) study factors that may aid in increasing seed production; and (6) conduct extensive strain tests with improved material and increase foundation seed in accordance with objective No. 2.

Agron., Substas. 460. Coop. ARS

Utah *The Selection, Testing, and Improvement of Forage Crops for Salt and Water Tolerance*. To (1) accumulate seed stocks of forages with some salt and/or water tolerance; (2) develop methods of testing and test salt and water tolerance of said plants; and (3) distribute to interested experiment stations seed and/or plant materials of more promising species to use in breeding programs.

Agron. 464 (W-40)

Vt. *Genetical and Adaptation Studies Relating to Hay and Pasture Legumes. -- II. Studies of the Adaptability of Legumes for Vermont Pastures and Hayfields*. Determination of characteristics and performance of improved strains of biennial clovers like Red and Sweet clover in association with certain grasses; characteristics and performance as perennials of strains of Zig-Zag clover (*Trifolium medium*), subterranean clover (*T. subterranean*), Hungarian clover (*T.* pannonicum), white clovers (*T. repens* and *T. repens* var. Ladino), Oregon creeping and other strains of alfalfa (*Medicago sativa*), and characteristics and performance for hay and pasture of superior types of Zig-Zag clover in grass associations.

Bot. 21-II

W. Va. *Forage Crops Varieties, Strains, and Species for West Virginia*. To (1) evaluate forage crop varieties and species and to determine their suitability to soil and climatic conditions prevailing in West Virginia, (2) evaluate new strains of forage crops as they become available for testing, and (3) determine effect of several systems of management on yield and persistence of various varieties and species of legumes.

Agron. 54. Coop. USDA

Wis. Yields of Dry Matter and Crude Protein from Several Forage Crops of Importance to Dairy Cattle. To (1) grow a number of annual, biennial, & perennial forage crops of current importance in Wisconsin at several levels of fertility ranging from moderate to very high, (2) sample these crops at various stages of maturity, & (3) learn yields of dry matter and crude protein from each.
Agron. 345

B. Grasses

Ariz. Breeding Sorghums for Increased Uniformity in the Field and for Improved Agronomic Characteristics and Increased Production of Grain and Forage. To (1) discover cause of and reduce variation in height of Early Hegari, Martin's Milo, and certain other sorghums produced under certification, thereby improving quality of seed marketed; (2) develop thru breeding methods improved adapted varieties of grain sorghums and sorgos for local use as feeds or by industry; and (3) study inheritance of important genetic characters in sorghum plant.
Agron., Pl. Brdg., Chem. 309

Ark. The Development and Improvement of Forage Grasses for Arkansas. Develop (1) strains of orchard grass superior in heat & drought resistance, foliage disease resistance, stand longevity, & high yield; (2) Bermuda & Dallisgrass strains that will produce palatable forage during high temperature and/or low rainfall, that is resistant to attacks of foliage diseases & tolerant to winter weather conditions.
Agron. 456 (S-12)

Ark. Improvement and Management of Sorghums. (1) Develop or improve thru breeding, introduction, & selection, varieties or hybrids with high yielding ability suited to State conditions: grain sorghum, forage sorghum, pearl millet & sudan, perennial sorghum. (2) Develop new & improve present management practices as: methods of planting after small grain harvest, overseeding grain sorghum with a crop for fall & winter grazing, establishment & maintenance of perennial sorghum.
Agron. 457

Calif. Breeding Alfalfa Adapted to Desert Valley Areas of Southwestern United States with Special Emphasis on Resistance to Yellow Clover Aphid (Therioaphis ononidis). Develop a variety of alfalfa of superior yield & adaptation to desert valleys of southwest by (1) breeding for resistance to yellow clover aphid, (2) continuing & expanding work on tolerance to Rhizoctonia crown & root rot, (3) breeding for increased winter growth habit, (4) breeding for tolerance to alkali & high water table conditions, & (5) breeding for lodging resistance.
Forage Crops, Ent., Pl. Path. 1646. Coop. ARS

Colo. Sorghum Improvement. (1) Improve yields & quality of grain sorghums, forage sorghums, Sudangrass, & broomcorn for dryland & irrigated conditions in Colorado by breeding & cultural methods. (2) Maintain seed stocks of recommended varieties or hybrids of sorghums released to growers within the State. (3) Experiment with cultural practices as: rotations or crop sequence, seed treatment, seeding practices, etc.
Agron. 15

Colo. Selection and Improvement of Strains of Native and Introduced Species of Grasses and Legumes for Forage Production Under Central Great Plains Conditions. (1) Find better adapted species for specific conditions of Central Great Plains, e.g., adaptation to midsummer grazing. (2) Improve native & introduced species by selection & breeding. (3) Study genetics & cytology of native & adapted species.
Agron. 232 (W-40)

Del. Identification of Grass Species. Develop a key for the identification of grasses in the vegetative state which will include most of the cultivated & weed grasses of agricultural importance in Delaware & the Northeast.
Agron., Agr. Engin. 58A

Fla. Forage and Pasture Grass Improvement by Breeding. Breed forage and pasture grasses having high yielding ability, good nutritive value, resistance to diseases, and tolerance to unfavorable weather.
Agron. 850. Coop. ARS

Idaho Improvement of Intermediate Wheatgrass by Selection and Recombinations. To develop a strain of Intermediate wheatgrass, *Agropyron intermedium* (Host) Beauv. which is more uniform in vegetative characteristics & higher in seed and forage production than the strains now in common use.
Agron. 222. Coop. SCS

Ind. Breeding and Selection of Forage Grasses of Agricultural Value and Local Adaptation. To develop by breeding and selection high yielding varieties of forage grasses well adapted to soil & climatic conditions of Indiana.
Agron. 760

Iowa The Development of Improved Forage Grasses. (1) Learn: a more efficient breeding procedures & experimental plot techniques in evaluating clones & conducting strain trials; b degree of segregation for combining ability at various levels of inbreeding in polyploid grasses; c most efficient procedures for recombining outstanding clones; d conduct trials on new strains of grasses developed in Iowa & in regions of similar environment; e study genetics of important traits for improved information on planning breeding procedures; f evaluate introductions from NC-7 for breeding stock. (2) Learn: a extent diseases play in productivity of grasses; b pathogens of importance on bromegrass, etc.; c develop techniques for measuring resistance and susceptibility to pathogenic organisms of different host strains & clonal selections; d apply information gained to developing disease resistant varieties.

Agron., Bot., Pl. Path. 1333 (NC-7) Coop. ARS

Ky. Breeding Improved Varieties of Pasture, Hay and Turf Grasses. (1) Select or develop improved varieties of tall fescue & Kentucky bluegrass for pasture & turf; select varieties of orchard grass, smooth bromegrass, & timothy for pasture & hay. (2) Study & develop breeding techniques & procedures applicable to tall fescue & Kentucky bluegrass. (3) Study genetics & breeding behavior of grasses in (2).

Agron. 176. Coop. ARS

La. The Improvement of Dallisgrass (Paspalum dilatatum) for Seed and Forage Production. To (1) develop new strains, varieties or types better suited to Louisiana and the Southern region for forage & seed production; (2) determine extent apomixis exists in reproductive process of Dallisgrass.

Agron. 484

Md. Breeding Orchard Grass for Maryland. To (1) isolate & develop strains of orchard grass that give superior performance in pasture mixtures in Maryland; (2) isolate and develop superior, late-maturing strains of orchard grass for use as hay, primarily with alfalfa; (3) test and evaluate lines and strains of orchard grass found to be superior at other stations in the Northeast and Virginia; & (4) isolate and evaluate lines and strains for use as a grass cover in orchards.

Agron. B-56-i (NE-28) Coop. USDA

Mass. Breeding Improved Strains of Orchard Grass (Dactylis glomerata L.) for Massachusetts and the Northeast. To select uniform strains of orchard grass, thru inbreeding and hybridization, with the following desirable features: 1. winter hardiness; 2. late maturity; 3. leafiness; 4. resistance to lodging; 5. resistance to diseases; & 6. sustained productivity.

Agron. 11

Minn. Varietal Improvement in Smooth Brome and Other Forage Grasses. -- 1. Selection and Breeding of Bromegrass. 2. Selection and Breeding of Other Forage Grasses. 3. Varietal Testing of Forage Grasses. To (1) select and breed improved strains of smooth brome and other forage grasses; (2) test promising forage grasses under Minnesota conditions; & (3) improve and develop grass breeding techniques.
Agron., Pl. Genet., Pl. Path., Bot. 1315. Coop. ARS

Mont. Effect of Moisture Stress During Germination on Genetic Shift in Perennial Forage Genotypes. (1) Evaluate moisture stress effects on genotypic changes in a forage species. (2) Compare methods of learning germination responses under moisture stress.
Agron., Soils 930 (W-58)

Nebr. The Introduction, Multiplication, Preservation and Determination of Potential Value of New Accessions and Strains of Native and Exotic Grasses. (1) Propagate and evaluate new accessions of forage grasses for purpose of identification of desirable characteristics as seed size, seedling vigor, forage quality, disease resistance, insect tolerance, drought and cold tolerance, and large yields of forage or seed. (2) Evaluate accessions for potential production and adaptation on different soil types and under different climatological conditions in Central Great Plains. (3) Preserve superior characteristics that may be identified thru their incorporation into existing breeding stocks, so as to further superior varieties.
Agron. 348 (NC-7) Coop. ARS

Nebr. Breeding Regionally Adapted Sudangrass Varieties and Hybrids with Specific Reference to Low Hydrocyanic Acid Content and Seed Production. (1) Learn genetic principles involved in inheritance of HCN in sudangrass. Develop (2) non-shattering, combine height male-sterile seed parents for producing hybrid sudangrass seed; (3) early maturing sweet stalked, sudangrass hybrids low in HCN. (4) Evaluate forage and seed yield and HCN content of experimental materials, known varieties, and introductions.
Agron. 561. Coop. ARS

N. H. The Adaptation and Productivity of Regionally Developed Selections and Strains of Smooth Bromegrass as Related to Morphologic and Physiologic Characteristics. To (1) learn establishment, productivity, and persistence of regionally developed strains of smooth bromegrass in relation to standard check varieties, (2) relate strain performance to observable morphologic and physiologic characteristics of plants used as parents for these strains, (3) use this data in improving methods for breeding forage plants of wider adaptation and in establishing selection criteria for future plant breeding work.
Agron. 94 (NE-28)

N. C. The Improvement of Orchard Grass and Tall Fescue Through Breeding. (1) Study plant to plant variation in orchard grass and tall fescue at a high level of nitrogen fertilization. (2) Use information in breeding of improved orchard grass and tall fescue for use in mixtures and in pure stands.
Field Crops 65

N. Dak. Sudangrass Improvement for North Dakota. To produce, select and test lines of sudangrass which are agronomically adapted to North Dakota conditions and which are lower in hydrocyanic acid content than the commonly grown varieties.
Agron., Agr. Chem., Anim. Indus. 6-10

Okla. Sorghum Breeding Investigations - The Development of Improved Varieties of Sorghum. To (1) develop by breeding: a dwarf quick-maturing, high-yielding kafir; a combine milo-kafir resistant to lodging, chinch bug damage and grain weathering; improved dwarf kafir, more resistant to lodging, insect damage, and grain weathering and with heads ripening before stalks, than is found in other varieties; a dwarf combine sorghum for eastern Oklahoma; and forage and sirup sorghums resistant to leaf-spot disease and lodging; (2) study possibilities of hybrid sorghum seed development; and (3) determine reactions of the several sorghum varieties to insects.
Agron., Ent. 400. Coop. ARS

Okla. Breeding to Improve Native and Exotic Pasture Grasses for Oklahoma Conditions. To (1) produce by introduction, selection or plant breeding new and superior strains of native and exotic grasses for Oklahoma pastures -- grasses of proven value shall be improved with particular emphasis on better forage quality, seed production, disease resistance and similar characters of switchgrass, Indian grass, side-oats grama, blue grama, big bluestem, sand bluestem, little bluestem, smooth brome, buffalo grass, sudangrass, western wheatgrass, Texas bluegrass, sand lovegrass, other lovegrasses, Dallisgrass, Asiatic bluestems, Bermuda grass, and other grasses; (2) investigate fundamental qualities and properties of various species as grazing plants, and obtain information concerning their breeding behavior, strain adaptation, capacity for improvement, response to various breeding systems, and their general economic potential; and (3) make all promising strains and varieties available to Seed Production Unit for test increase and to coordinate breeding program with testing and management phases of the entire pasture improvement program.
Agron., Pl. Path. 437. Coop. ARS

Oreg. Forage and Cover Crop Seed Improvement. -- I. Tall Fescue (Festuca arundinacea) Breeding. To (1) evaluate, adapt, and devise techniques and methods essential to the development of improved strains of forage crops; and (2) develop by selection and hybridization improved strains of tall fescue adapted to forage and seed production.

Agron. 80-1

Oreg. Biochemical Composition of Individual Plants of Tall Fescue (Festuca arundinacea) as Influenced by Genotype and Environment. To (1) learn influence of genotype on biochemical composition; (2) attempt to relate such data to palatability and nutritive value; and (3) initially, to learn yields, crude protein contents and such related techniques as criteria for learning stages of maturity at which plants are to be harvested.

Agr. Chem., Farm Crops 80-3

Pa. Evaluation of Grasses and Legumes for Hay, Silage, and Pasture. -- C. Evaluation of Grasses and Legumes for Use as Poultry Pasture. To evaluate (1), orchard grass; and (2) six species of grass grown in association with Ladino clover for preference by turkeys, persistence and productivity.

Poultry Husb., Agron., Agr. & Biol. Chem. 1024-C. Coop. ARS

Pa. The Genetics and Improvement of Forage Grasses. To (1) determine relative merit for various regions of Pennsylvania of available varieties and strains being developed, (2) investigate factors limiting forage production and utilization of those species which evidence potential merit in forage production program, (3) conduct genetic studies with certain species to implement breeding phase of the work, and (4) develop superior varieties of species which are selected as showing most promise for Pennsylvania conditions.

Agron. 1108 (NE-28) Coop. ARS

P. R. Improvement of Forage Grasses for Puerto Rico and with Possible Adaptation of the Southern Region. To (1) develop by selection or hybridization new varieties of grasses superior in yield and nutritive value adapted to the various soil and climatic conditions of the Island and that might also be adapted to the Southern States; (2) make cytological studies of the most important grasses found in Puerto Rico and study their genetic behavior; (3) make introductions of grasses from foreign countries and test for adaptability and good agronomic characteristics; (4) make regional tests of the selections, hybrids, or introductions showing probabilities of attaining economical value under different soil and climatic conditions and to produce propagating material for the Southern States that may require it to be tested under their conditions; and (5) maintain a grass collection which will provide germplasm for the breeding schemes in Puerto Rico and which might have possible use for the Southern States.

Plant Brdg. 31 (S-12)

S. C. Orchard Grass Improvement. To (1) evaluate available varieties, introductions, and seed sources of orchard grass under major soil and climatic conditions of the stand for pasture, hay, silage, and soil improvement; (2) determine occurrence, prevalence, and relative importance of factors such as diseases, insects, droughts and others that contribute to losses of stands, yields and quality of orchard grass; (3) develop by selection, hybridization, and other breeding methods, superior varieties that are high yielding and of excellent quality adapted to principal crops and soil regions of the state and Southern region; and (4) develop ways and means of increasing initial or breeder seed or vegetative material of superior varieties while at the same time maintaining genetic purity.
Agron. 129 (S-12) Coop. ARS

S. Dak. Breeding and Testing Forage and Grain Sorghums and Sudangrass. 1 - 6 To develop (1) grain sorghums adapted for climatic conditions of state. Place emphasis on high yielding strains that stand longer after killing frost, possess open panicles, larger seeds, greater and sturdier seedlings as well as drought, insect, and disease resistance, (2) forage sorghums and sudangrass low in hydrocyanic acid, early maturing and produce high yield of high quality palatable forage, (3) dual purpose large-seeded grain and sweet stalked forage types, low in hydrocyanic acid for silage and fodder, (4) male sterile lines and recover lines for hybrid sorghums, (5) new variants using colchicine, radiation, etc., (6) and evaluate agronomic factors and adaptability of sorghums and sudangrass under climatic and environmental conditions of state. (7) Cooperate with near experiment stations and USDA thru conferences, testing programs, and exchange of material.
Agron. 61

S. Dak. The Breeding and Testing of Superior Grasses Adapted to South Dakota. (1) To originate by breeding and selection strains of grasses adapted to South Dakota conditions. (2) To introduce and determine the adaptability of strains and species of grasses for the different agricultural areas of the state. (3) To determine the palatability and nutritive value of superior strains. (4) To cooperate with institutions in neighboring states by exchanging of ideas and materials. (5) To pursue studies calculated to increase fundamental knowledge relating to the breeding of grasses.
Agron. 182

Tenn. Improvement of Cultivated Grasses. To obtain by hybridization and selection grasses better suited to Tennessee conditions for hay and pasture.
Agron. 39. Coop. TVA

Tex. Improvement and Production of Forage Grasses. To (1) determine best grasses adapted to given climatic regions of the state by testing both native and introduced species, strains, and varieties now available; (2) select plants of strains which are superior in one or more of the following characteristics: quantity of forage, yield and viability of seed, ability to compete successfully with other plants, ability to renew growth quickly after defoliation, longevity, drought resistance, winter hardiness, disease resistance, and palatability and nutritive value of herbage; (3) combine into a single plant, strain or variety by breeding methods as many of the desirable forage characteristics as possible; (4) conduct fundamental breeding behavior, mode of reproduction, genetic and cytogenetic studies to aid in the improvement of grass species; (5) conduct basic physiological, cultural and life history studies; (6) increase seed of new species and strains; and (7) conduct extensive strain tests with new and improved material.
Agron. 387 (S-12) Coop. ARS

Tex. Evaluation of Potentially Drought Resistant Grasses for the Southwest. To determine (1) relative drought resistance, aggressiveness, longevity, reproductive ability, forage value, and adaptation to specific climatic conditions for ecotypes of more important range grasses selected for potential drought resistance; and (2) adaptation of more desirable drought resistant ecotypes for establishment and maintenance under existing range and site conditions of the area.
Range and Forage, Agron. 988. Coop. SCS

Utah Cytogenetic Studies on Inter-Mountain Range Grasses. (1) Develop new species of grasses thru inter-generic and interspecific crosses followed by induced polyploidy. (2) Accumulate basic information on the cytogenetics of speciation in grasses.
Bot. 361

Va. Physiological and Ecological Adaptation of Orchard Grass, *Dactylis glomerata*, Phenotypes. To measure performance of different morphological orchard grass phenotypes, grown in pure stands and in mixtures with alfalfa and Ladino clover, using different cutting heights and frequencies.
Agron. 93902 (S-12)

Va. Orchard Grass Improvement. To (1) develop adapted, disease-resistant varieties of orchard grass for Southeastern states that can be used for hay and/or grazing; (2) determine inheritance of resistance to certain diseases and of certain agronomic characteristics to provide better basis for combining specific characteristics into a variety; (3) measure performance of specific morphological phenotypes under various ecological and physiological conditions in order to determine plant growth types best suited for various management practices and specific legume-grass combinations; and (4) test performance of new breeding material developed from this and other projects under different Southeastern environments.
Agron. 93907 (S-12)

Wash. Cytological Evaluation And Improvement of Forage Grasses. To make cytogenetic study of (1) genus Agropyron and its hybrid derivatives, (2) factors affecting fertility of meadow foxtail and Merion bluegrass, and (3) to organize study of literature on genus Agropyron.
Agron. 1288

Wyo. Breeding Forage Grasses for Improved Quality and Greater Production. (1) Select, evaluate, and catalog productive, high-feeding value ecotypes of forage grass species. (2) Learn mode of reproduction and breeding behavior of selected species. (3) Combine in a synthetic or a polycross the desirable ecotypes selected. (4) Test progenies of selected ecotypes for forage and seed production.
Agron. 654

Wyo. Preliminary Multiplication and Testing of South American Grasses for Warm Season Forage on the Semi-Arid Range in Wyoming. Make preliminary evaluation of grasses of temperate South America for adaptation to conditions of the semi-arid western range in site areas in Wyoming typical of dry summer ranges in Washington, Oregon, California, Idaho, Nevada, Montana, Colorado, and Utah.
Agron. 678 (W-6)

C. Alfalfa

Alaska Breeding Alfalfa Varieties Resistant to the Blackstem Complex. To develop strains of alfalfa resistant to blackstem caused by several organisms in that complex, and to investigate genetic nature of resistance to blackstem, using diploid *Medicago falcata*.
Agron. 44(R) (NC-37) Coop. ARS

Ariz. A Study of Variability in Adapted Commercial Alfalfa Varieties and Methods for their Improvement. To determine nature and extent of variation in alfalfa varieties and possibility of using this information in establishing improved varieties.
Pl. Brdg. 4

Calif. Alfalfa Improvement Including Breeding, Production, and Management Practices. (1) Develop by breeding methods, strains of alfalfa resistant to: bacterial wilt, dwarf disease, leaf diseases, root and crown rotting organisms, aphids, and nematodes; improve quality and yield of alfalfa by breeding; develop basic data on genetics and cytogenetics of alfalfa; develop basic data on fundamental nature of resistance to certain diseases and insects; and evaluate new alfalfa varieties for forage. (2) To improve management practices to obtain highest possible production of total digestible nutrients per acre, study: time of cutting, curing process, water management, fertilization, weed and pest control, harvesting practices and equipment, and varietal relationship to management practices. (3) Study to improve management practices to obtain highest possible production of high quality seed by investigating: condition of stand, water management, pollination problems, weed and pest control, plant population studies re seed production, evaluation of varieties for yield, and effect of production practices on quality.
Agron. 972. Coop. ARS

Calif. Manipulation and Use of Incompatibility Alleles in Ladino Clover (Trifolium repens L.) for the Development of Double-Cross Hybrid Varieties for Commercial Production. (1) Obtain clones superior agronomically and homozygous for self-incompatibility alleles. (2) Learn combining ability of selected clones in single- and double-cross combinations. (3) Develop practical methods of utilizing clonal lines and F_1 hybrids required in production of double-cross seed. Learn (4) correlation of certain morphological characteristics with yield to improve basis for selection; (5) effect of time and amount of flowering on forage production and inheritance of flowering characteristics.
Agron. 1709

Colo. Winterhardiness and Disease Resistance in Alfalfa. To increase (1) bacterial wilt resistance of Meeker Baltic alfalfa while maintaining or increasing the present level of resistance to other diseases and the forage productivity; and (2) seed setting ability of Hardistan alfalfa while maintaining or increasing present level of forage productivity and wilt resistance.
Agron. 7

Storrs (Conn.)

The Adaptability of New Varieties of Alfalfa for Forage in Connecticut. To determine establishment, hardiness, disease resistance, habits of growth, and seasonal and total yields of alfalfa developed in the Northeast, and relationships of their characteristics to performance.

Pl. Sci. 220 (NE-28)

Ind.

Alfalfa Improvement Through Selection and Breeding. To develop by breeding and selection high yielding, disease and insect resistant varieties of alfalfa of high nutritional quality well adapted to environmental conditions of Indiana.

Forage, Pl. Path., Ent., Agron. 245. Coop. ARS

Iowa

Improvement of Alfalfa, Red Clover, and Other Legumes by Breeding. To (1) compare varieties, strains and selections for adaptation, yield of forage and seed, insect and disease resistance, and longevity in field tests, (2) develop superior disease resistant varieties for Iowa, (3) study nature of seed setting ability, influenced by genetic and environmental factors, (4) study self- and cross-fertility relations, and (5) determine most effective methods of evaluating varieties and breeding material in greenhouse, nursery and field trials.

Agron., Bot., Pl. Path. 1048. Coop. ARS

Kans.

Developing and Testing Pasture-Type Alfalfas. (1) Evaluate various alfalfas, including foreign introductions, as to their ability to persist and survive under the extreme climatic and management practices that prevail on the range. (2) Develop, from the best strains, through selection and breeding, adapted high yielding, disease- and insect-resistant varieties. (3) Study the behavior of pasture-type alfalfas under different management practices and soil and climatic conditions. (4) Conduct uniform variety yield trials involving pasture types.

Agron. 473. Coop. USDA

Maine

Establishment, Persistence, and Productivity of Regionally Developed Strains of Alfalfa as Related to Morphologic and Physiologic Characteristics. To (1) determine establishment, persistence and productivity of regionally developed strains of alfalfa; (2) relate above data to observable morphologic and physiologic characters of strains; (3) compare performance and characteristics of strains among themselves and in relation to standard check varieties; and (4) use observed data in determining methods for intelligent formulation of regionally adapted synthetic varieties and in establishing selection criteria for more efficient plant breeding.

Agron. 42 (NE-28)

Minn. Alfalfa Improvement for Minnesota Conditions. 1. Breeding studies. 2. Seed production studies. 3. Strain and varietal trials.
Agron., Pl. Genet. 1319

Mo. Testing of Alfalfa Strains. To improve alfalfa in yield, quality and resistance to disease, thru selective testing of varietal strains.
Field Crops 241

Nebr. Alfalfa Improvement and a Study of the Principles Involved. To determine reproductive habits of alfalfa and most effective breeding procedures, together with actual improvement of such characters as yield of forage and seed, quality of forage, and resistance to diseases, harmful insects, and winter injury.
Agron. 181. Coop. ARS

Nebr. Preservation of Alfalfa Clones and Seed Stocks Needed in Alfalfa Improvement and Preliminary Evaluation of Plant Introductions. Propagate asexually clones selected by experiment station workers and tested as clones and in local station polycross progeny trials and agreed upon by Central Alfalfa Improvement Conference or National Conference for inclusion in regional and/or national clonal nurseries or polycross nurseries, or other types of progeny. To maintain clones for use in synthetic combinations based on clonal and progeny performance. Maintain and propagate clones selected for special studies as inheritance. Increase sexually advanced generations of synthetic combinations. Make preliminary evaluations of new plant introductions.
Agron., Pl. Path. 347 (NC-7) Coop. ARS

Nev. Breeding Alfalfa for Resistance to the Spotted Alfalfa Aphid. (1) Learn relative resistance of commonly used varieties of alfalfa to spotted alfalfa aphid. (2) Evaluate new varieties, synthetics and introductions for resistance to spotted alfalfa aphid. (3) Learn mode of inheritance of resistance to aphid. (4) Develop varieties resistant to spotted alfalfa aphid and otherwise adapted to intended areas.
S. Nev. Field Station, Agron. 39 (W-40). Coop. ARS

Nev. Alfalfa Production, Breeding, Disease and Quality Investigations. To (1) search for and perpetuate for use in breeding program alfalfa plants that are resistant to parasitic organisms which damage alfalfa; (2) develop, by breeding, a variety of alfalfa that will be resistant to disease organisms which attack alfalfa; (3) determine adaptation of newly developed varieties to different environmental conditions; and (4) determine influence of management on productivity and length of life of stands of newly developed alfalfa varieties.
Agron. 75. Coop. ARS

Okla. *Breeding to Improve Alfalfa for Pasture and Hay*. To develop types of alfalfa suitable for pasture under Oklahoma conditions; and improve production and quality of Oklahoma hay-type alfalfas.
Agron., Bot., Pl. Path. 832. Coop. ARS

Pa. *The Genetics and Improvement of Alfalfa (Medicago sativa L.)*. To (1) determine best existing strains or varieties of alfalfa for Pennsylvania; (2) determine methods of testing to give most reliable and consistent data for strain evaluation; (3) investigate environmental factors, diseases, and insects affecting persistence and forage yield; (4) conduct genetic studies with alfalfa and related species that may clarify origin of *Medicago sativa* and implement alfalfa breeding; and (5) develop superior varieties for Pennsylvania.
Agron. 1190. Coop. ARS

R. I. *Establishment, Persistence, and Productivity of Regionally Developed Clones and Varieties of Alfalfa*. To (1) learn the establishment, persistence, and productivity of regionally developed clones and varieties of alfalfa, (2) relate above performance data to observable morphologic and physiologic characteristics of the selections, (3) use this information in learning methods for developing regionally adapted varieties from selections tested throughout the Northeast region, (4) compare performance and characteristics of new selections among themselves and in relation to standard check varieties in order to learn regional adaptation of new varieties.
Agron., Pl. Path., Ent. 214 (NE-28) Coop. USDA

S. Dak. *The Genetics of Reaction of Alfalfa to Diseases of the Blackstem Complex*. To (1) learn genetic nature of reaction to foliar diseases represented by the blackstem complex, using diploid alfalfa, and (2) originate and use methods of breeding so disease resistance may be incorporated into improved alfalfa strains.
Agron. 302 (NC-37)

Va. *Evaluation of Radiation Induced Mutations for Use in an Alfalfa Breeding Program*. (1) Evaluate mutants produced by radiation in view of use in an alfalfa breeding program. (2) Learn radiation dosage and methods required to obtain mutations. (3) Learn frequency and types of mutations produced by radiation.
Agron. 86083

W. Va. *Alfalfa Breeding and Genetic Investigations*. To (1) evaluate alfalfa introduction, strains selections for agronomic characteristics; (2) combine selected alfalfa breeding materials in hybrids and synthetics by controlled hybridization and polycross methods; (3) evaluate polycross progenies and synthetic combinations produced in breeding nursery and similar promising materials developed at other stations; and (4) study inheritance of selected genetic characteristics in alfalfa.
Agron., Genet. 66 (NE-28)

Wis. Alfalfa Breeding. To develop (1) resistance to common leafspot (Pseudopeziza medicaginis); (2) persistence of stand under frequent cutting and grazing; (3) seedling vigor and capacity to withstand annual weed and nurse-crop competition; (4) seed producing capacity, resistance to leafhoppers, bacterial wilt, "crown deterioration", black stem, downy mildew, and yellow leaf blotch.
Agron., Pl. Path., Ent. 321. Coop. ARS

D. Clovers

Ala. White Clover Improvement. To (1) develop by plant breeding varieties of white clover which are superior to existing varieties; (2) determine importance of and heritability of plant characteristics which contribute to agronomic value of white clover; and (3) to develop techniques to identify plants carrying desirable germ plasm.
Agron., Soils 547

Calif. The Effect of Environment on Genetic Shift and its Influence on the Forage Value of a Variety. To (1) determine effect of successive generations and successive years of same generation upon genetic expression of characteristics of a variety; (2) determine if genetic changes, should they exist, affect forage value; (3) determine physiological basis for genetic changes with special attention to photoperiodic and temperature response; and (4) cooperation with Washington Station in studying seed yields of clonal material developed in other regions for seed production in the West.
Agron. 1585 (W-58)

Fla. Breeding Improved Varieties of White, Red and Sweet Clover. To develop long lived, high yielding, disease resistant strains of clover for use in permanent pastures.
Agron. 600. Coop. ARS

Hawaii Interaction of Environmental and Genetic Factors Affecting Reproduction in White Clover. Study (1) effects of temperature, moisture and day length on reproductive potential of white clover; (2) genotypic response of clover to effects of temperature and moisture.
Agron., Soil Sci. 124.3 (W-58) Coop. USDI, SCS

Ill. Varietal Improvement and Genetic Behavior of Forage Legumes. To (1) develop a strain (or strains) of red clover which will be persistent under field conditions for at least two full growing seasons and which will be superior to existing strains in one or more important agronomic characteristics; (2) develop a strain (or strains) of birdsfoot trefoil which will have improved agronomic characteristics, with particular reference to ability to become established and thrive in permanent pastures in Illinois; (3) study methods of breeding forage legumes, and to determine which methods are best suited for evaluating parent material and for developing new strains; and (4) produce interspecific crosses in the genus Trifolium, both before and after chromosome doubling, and to evaluate the agronomic behavior of such crosses, if produced.
Agron. 15-375

Ind. Red Clover Improvement Through Selection and Breeding for Desirable Agronomic Characteristics and the Control of Diseases and Insects. To develop by breeding and selection high yielding varieties of red clover well adapted to environmental conditions of this area and having resistance to diseases and insects.
Bot., Pl. Path., Agron., Ent. 769. Coop. ARS

Iowa Sweetclover Improvement. To (1) develop improved strains of diploid and tetraploid sweetclover through recombination of inbred lines and/or selected plants maintained by clonal propagation, (2) determine systems of breeding to utilize most efficiently the inbred lines and selected plants in developing superior strains, (3) investigate possibilities for utilizing inter-specific hybridization in Melilotus as a means to transfer desirable genes to economic species, (4) determine systems of self-incompatability as related to problems of inbreeding, and (5) evaluate autotetraploid sweetclover from agronomic value and cytological and morphological characteristics.
Farm Crops, Bot., Pl. Path. 1150

La. The Development of New Strains, Varieties or Types of White Clover, Red Clover, and Annual Lespedezas. To develop these strains, varieties, and types for better adaptation to the climatic and soil conditions and suitability for use in pastures or for hay.
Agron. 536. Coop. ARS

La. Breeding Improved Forage Plants, Particularly Red and White Clovers, for the South. To (1) study and develop breeding techniques and procedures applicable to red and white clover under conditions peculiar to the South; and (2) develop varieties and strains of red and white clovers adapted to the South which will assist in providing a more dependable supply of high quality forage all year.
Crops and Soils 805 (S-12)

Md. Red Clover Improvement. To (1) further increase resistance of promising strains to Colletotrichum trifolii and improve forage quality and yield; (2) investigate more thoroughly reasons for stand elimination of red clover in Maryland; and (3) broaden breeding program to develop better red clover strains for Maryland in light of findings under objective 2.
Agron. B-56-a. Coop. ARS

Md. Ladino Clover Breeding. To (1) isolate and develop superior strains of Ladino clover for pasture, grass silage and hay use, (2) test and evaluate superior strains at nearby institutions or in western part of United States where most seed for Maryland use is produced, (3) cooperate in regional phases of Ladino clover improvement.
Agron. B-56-g (NE-28) Coop. ARS

Miss. Comparative Evaluation of Subterranean Clover as a Pasture Legume. To learn (1) varieties or strains of subterranean clover most suitable for state conditions, (2) best strains of Rhizobia bacteria for nodulation on subterranean clover roots, (3) fertility requirements of subterranean clover, (4) after above tests, compare clover with other pasture legumes in grass mixtures, under grazing conditions, for production and maintenance.
Agron. HC-9

Nebr. Sweetclover Improvement. To (1) improve quality of sweetclover forage thru development of varieties that are lower in coumarin content, leafier and finer stemmed; (2) counteract hazards involved in establishing and maintaining productive stands by breeding and selecting for weevil tolerance or resistance, larger seed size, drought and frost tolerance, winter hardiness, disease resistance, and (3) maintain or increase existing high forage and seed productivity and value as a soil-building crop.
Agron., Engin. 488. Coop. ARS

Nev. The Effect of Environment and Cultural Treatment on the Reproductive Responses of Stoloniferous Clovers. Learn effect of environment and cultural treatment on reproductive potential of strawberry, Ladino, and white Dutch clover.
Agron., Range Mgt., Agr. Chem. 2 (W-58)

N. H. The Improvement of White Clover. (1) Study life cycle of strains of white clover in relation to diseases and persistence. (2) Learn resistance of white clover varieties and strains to diseases of major importance by: survey of diseases in region and life cycle studies of causal organisms, and developing techniques for obtaining infection with fungi of major importance. (3) Collect and relate climatic data to disease development, growth and persistence of white clover. (4) Thru breeding and selecting, develop more persistent varieties of white clover for northeast.
Agron. 105 (NE-28) Coop. ARS, USDC-WB

N. Dak. Improvement of Sweet Clover. To combine low coumarin content with suitable leafiness, stem fineness, and maturity for North Dakota conditions, with minor attention to resistance to sweet clover weevil, various diseases, and seed coat permeability.
Agr. Chem., Agron. 6-9

Pa. The Genetics and Improvement of Red Clover. To (1) determine strains of red clover best suited for use in Pennsylvania, (2) investigate environmental factors, diseases, and insects affecting longevity, yield of forage and seed production, (3) conduct genetic studies to implement breeding phases of project, and (4) develop superior varieties of red clover by plant breeding techniques.
Agron. 1109 (NE-28) Coop. ARS

Tenn. Breeding and Genetics of Crimson Clover. To (1) find a variety resistant to shattering of seed; (2) find a variety later maturing than present ones; and (3) make studies on the genetics and cytology of crimson clover.
Bot. 75

Vt. Genetical, Cytological, and Embryological Studies in the Genus Trifolium (Investigations in Forage Clovers). I. Tetraploid Ladino Clover (Trifolium repens var. Ladino). II. Zig-Zag Clover (Trifolium medium). (1) Make studies of meiotic divisions and quality of pollen in primary (C_1) and later generations (up to C_6) as these are related to vigor of plant and to percentage seed set. Make correlative studies of number of florets per head and ovule frequency per floret as related to percentage seed set in selected plants. Produce additional, primary autoploids of T. repens so to improve Vermont autoploids, by inter-crossing. (2) Study cross-compatability and cross-incompatability in selected genotypes of polyploid. Screen promising genotypes by their combining ability as shown by F-1 progeny of controlled crosses. Study meiotic behavior of selected parent clones as related to their percentage of good pollen and seed set and to vigor of their F-1 progeny.
Bot. 38

W. Va. Selection and Breeding of Superior Strains of Red Clover for West Virginia. To study (1) comparison of locally grown red clover with improved strains in various red clover producing regions; (2) securing of improved strains by breeding and selection; and (3) propagation and production of improved disease resistant high yielding strains.
Agron., Pl. Path. 34

E. Minor Legumes

Ala. The Improvement of Lespedeza and Vetch Through Cytogenetic Studies and Embryo Culture. (1) Study breeding behavior, inheritance, and cytogenetics of lespedeza and vetch. (2) Develop better techniques for hybridization among species of these crops. (3) Attempt interspecific crosses in Lespedeza and Vicia by use of embryo culture.
Bot., Pl. Path. 110

Ala. Breeding of Sericea Lespedeza, Crimson Clover and Vetch. To (1) develop improved variety of sericea that is more palatable, more nutritious, disease-resistant, and higher yielding; (2) develop higher yielding, more disease-resistant, non-shattering, hard-seeded variety of crimson clover producing earlier fall grazing; (3) develop vetch capable of producing high yields of green matter and seed; and (4) determine which varieties of certain legumes now available are best adapted as green manure crops for general use in the state.
Agron., Soils 404

Ark. The Improvement and Testing of Winter Annual Legumes. Obtain and test superior varieties and strains of winter annual legumes adapted to Arkansas.
Agron. 440. Coop. ARS

Fla. Evaluation and Improvement of Forage and Cover Crop Legumes Other than Clovers and Lupines. To develop superior varieties of forage and cover crop legumes particularly for those sections of Florida where clovers and lupines are least well adapted.
Agron. 301. Coop. ARS

Fla. Improvement of Lupines by Breeding for Yield and Insect and Disease Resistance. To develop improved varieties of lupines adapted to Florida conditions.
Pl. Path., Agron. 612

Ga. Breeding and Culture for the Improvement in Production and Utilization of Sericea and Crimson Clover. To (1) select and breed strains of sericea with low tannin content; (2) increase and distribute seed of low tannin lines; (3) determine cultural and genetic factors that influence tannin content of sericea; (4) determine best cultural practices for production and use of sericea and crimson clover; (5) develop more productive strains of crimson clover with emphasis on disease resistance; and (6) conduct variety and strain tests.
Agron., Pl. Path., Forage, Chem. 42

Ga. Selection and Breeding of Velvet Beans for High Production. To produce a variety or varieties incorporating these characteristics: 1. high production, 2. disease resistance, 3. less seed shattering after maturity, 4. less seed pod pubescense, and 5. early maturity.
Agron., Forage 206

Hawaii The Production of a Non-Toxic Forage Indigo. Develop a non-toxic variety of creeping indigo (*Indigofera endecaphylla*) and evaluate non-toxic related species of genus *Indigofera* for forage and other agronomic characters.
Agron., Soils Sci. 124.2

Ind. Birdsfoot Trefoil Improvement Through Breeding and Selection. Develop by breeding and selection high yielding, disease and insect resistant varieties of birdsfoot trefoil of high nutritional quality that are adapted to environmental conditions of state.
Agron. 892

Kans. Evaluation of Legumes, Native and Introduced, Other than Alfalfa. Establish and evaluate species of native and introduced legumes and maintain and increase any strains which may be valuable to agriculture or as source material for plant breeding.
Agron. 492 (NC-7)

Mo. Breeding to Develop Superior Varieties of Birdsfoot Trefoil and Annual Lespedeza. To develop (1) varieties of broadleafed birdsfoot trefoil superior to present commercial varieties in seed producing habits, persistence of stands, seedling vigor, and other agronomic qualities; and (2) more aggressive and productive varieties of annual lespedeza resistant to bacterial wilt.
Field Crops 221. Coop. USDA

Nebr. Introduction and Preliminary Evaluation of Legumes Other than Alfalfa and Sweet Clover. Assemble, grow and evaluate species, strains, and varieties of legumes and increase accessions as may appear valuable for special purpose plantings in Central plains.
Agron. 542 (NC-7)

N. Y. (Cornell) Birdsfoot Trefoil Investigations. -- 3. Birdsfoot Trefoil Improvement and Breeding. To develop hardy and productive hay and pasture strains and varieties of birdsfoot trefoil adapted to Northeastern United States; and include in such varieties characters which contribute to persistence, high forage quality and resistance to injury from insects and diseases.
Agron., Pl. Brdg. 47-3

N. Y. (Cornell) The Development of Improved Strains of Birdsfoot Trefoil Through Selection and Breeding. (1) Obtain information regarding genetics and breeding behavior of birdsfoot trefoil and related Lotus species. (2) Develop improved strains and varieties best suited to meet farm needs for a persistent, high yielding, and high quality forage legume to be used as hay, pasture and silage. (3) Improve varieties by selection and breeding.
Pl. Brdg., Pl. Path., Pl. Physiol., Ent. 56. Coop. ARS

N. C. The Development of High Yielding Varieties of Annual and Perennial Lespedeza with Improved Quality of Forage, and Resistance to Diseases and Insect Pests. To (1) isolate superior genotypes and recombine desirable traits insofar as possible into single varieties, (2) evaluate and characterize varieties and experimental strains, and (3) conduct studies on genetics and cytogenetics of lespedeza basic to development of sound and efficient breeding procedures.
Agron. 52 (S-12) Coop. ARS

Okla. Breeding to Improve Native and Exotic Pasture Legumes. To (1) assemble varieties and strains of native and exotic legumes in observation nurseries for preliminary screening on basis of adaptation and performance; and (2) produce new and superior varieties, using best available material for better adaptation, seed and forage yields, quality or disease resistance.
Agron. 767 (S-12) Coop. ARS

Okla. Selection and Breeding of Range Legumes for Western Oklahoma. To (1) assemble strains and varieties of leguminous species, both native and exotic, which might be adapted to western Oklahoma ranges in observation nurseries for preliminary screening on basis of adaptation and performance, and (2) produce new and superior strains using best material available as source material.
Agron. 783. Coop. ARS

Pa. The Genetics and Improvement of Birdsfoot Trefoil (Lotus corniculatus L.). To (1) determine which strains of birdsfoot trefoil are best suited for use in Pennsylvania; (2) investigate environmental factors, diseases, and insects having a direct influence on its culture; (3) conduct genetic studies with birdsfoot trefoil that may implement the breeding phase of the project; and (4) develop superior varieties thru use of plant breeding techniques.
Agron. 1129 (NE-28) Coop. ARS

Tenn. Breeding and Genetics of Vetches. To (1) increase erect habit of growth as opposed to running type; (2) increase winter habit of erect types; and (3) obtain adapted types from our native crown vetch, which are not poisonous to livestock.
Bot. 76

Tenn. Breeding and Genetics of Lespedezas. To increase (1) root bearing area of annual lespedezas; (2) seed bearing of Tennessee No. 76 types; and (3) palatability of Sericea.
Bot. 77

Vt. Establishment, Persistence and Productivity of Regionally Developed Clones and Varieties of Birdsfoot Trefoil. Determine establishment, persistence and productivity of regionally developed clones and varieties of birdsfoot trefoil; relate above performance data to observable morphological and physiological characteristics of selections; use information in developing regionally adapted varieties from selections tested throughout Northeastern region and establish selection criteria for more efficient plant breeding research; compare performance and characteristics of new selections among themselves and in relation to standard check varieties.
Agron. 25 (NE-28) Coop. ARS

Vt. Cytogenetical Investigations in the Genus Lotus (Birdsfoot Trefoil). (Plant Breeding Studies to Improve a Multiple-Purpose Forage Legume). (1) Make selection studies in a naturally occurring tetraploid species, Lotus corniculatus. (2) Polyploidization studies: cytological investigation in existing and in proposed additional tetraploid lines of Lotus tenuis and in Lotus uliginosus; cytological investigations in autoploids and amphiploids of non-cultivated species of Lotus with special reference to those species having non-shattering seed pods. (3) Study chromosome behavior and genetic segregation in existing synthetic hybrids between Lotus corniculatus and experimental auto-tetraploid lines of Lotus tenuis and hybridization of diploid- and experimental tetraploids of other species of genus Lotus.
Bot. 39. Coop. USDA

II. FORAGE CROPS CULTURE AND MANAGEMENT

A. General

Ala. Effects of Applied Lime and Fertilizers and Soil Fertility Level on the Production of Pasture and Forage Crops. (1) Learn best rates, combinations and frequencies of application of lime and mineral fertilizers for maintaining productive stands of pasture and other forage crops. (2) Relate yield responses on various soils to level of available nutrients as determined by lab. analysis. (3) Learn desirability of applying N to newly-seeded and established grass-legume pastures and learn effects of practice on botanical composition of pasture sward. (4) Evaluate effects of irrigation, N applications and grazing management on mineral fertilizer needs of pasture and forage crops and on level of soil fertility.
Agron., Soils 406

Ala. Evaluation of Forage Crops for Beef Cattle Production in the Piedmont Area of Alabama. Learn: (1) under grazing pressure the seasonal forage yield by cage difference technique of pure and mixed stands of forage crops and performance of lactating cows and their nursed calves grazed on these crops; (2) botanical and chemical changes in composition of pasture swards and influence of changes on cow and calf performance; (3) relation among forage yields under clipping, forage yields under grazing and cow performance; (4) feasibility of reducing labor requirements by mechanization of harvesting, storing, and feeding silage and hay. (5) Investigate supplementary feeding and factors of age and finish in relation to economics of forage crop use.
Agron., Engin., Anim. Husb., Nutr., Dairy Husb., Agr. Econ. 555

Alaska Forage Crop Production in Alaska. Learn best cultural practices for the economical production of superior forage and seed of recommended crop varieties for Alaska.
Agron. 41

Ariz. Culture and Water Economy of Soil Improving Crops. (1) Develop cultural practices for establishing a vegetative cover on irrigated farm land released from cultivation in Southern Arizona. (2) Learn minimum amounts of irrigation water necessary for survival of a desirable plant cover and the efficiency of use of this water in forage production. (3) Learn residual effect of cover crops on soil fertility and physical characteristics.
Agron., Range Mgt., Engin., Chem. 402. Coop. ARS, SCS

Ariz. Root Development of Forage Crop Species as Influenced by Physical and Chemical Factors of the Soil. Make laboratory, greenhouse and field observations of: (1) factors influencing root growth (temperature, moisture, aeration, salt concentration, pH); (2) effect of root growth on shoot growth; and (3) field study and control of root growth (seasonal variations in number and extent of roots, correlation of environmental factors with number of roots, and extent of root system).
Bot. 427 (W-47)

Ark. Studies of Physiological Factors Affecting the Growth of Agronomic Crops Grown Under Irrigation. To (1) determine critical time intervals of moisture stress which may affect yield and quality of certain selected agronomic crops, (2) learn water needs of agronomic crops under varied levels of soil fertility, moisture conditions, and stages of plant growth, (3) learn effect of supplemental irrigation on date and length of fruiting periods, maturity date, yield, and composition of agronomic crops, (4) study effect of soil and air temperatures, and relative humidity as modified by supplemental irrigation on physiological responses of the agronomic crops, and (5) learn possible effects of deposits of Fe and Mn from sprinkler applied irrigation water upon the physiology of some agronomic crops.
Agron. 392

Del. Differential Irrigation, Nitrogen Fertilization and the Top and Root Growth of Several Forage Species. Determine influence of differential irrigation and N fertilization on top and root systems of alfalfa, ladino clover, and birdsfoot trefoil, alone and in association with orchardgrass by placing emphasis on: effect of depth of wetting of profile on distribution of root systems; interactions that may exist between depth of wetting and species in relation to root and shoot development; influence of level of watering on species response to N applications; relationship between level of watering, N fertilization, and consumptive use of water by several forage species; seasonal effect of differential watering and N fertilization on carbohydrate reserves in storage organs of each species.
Agron., Agr. Engin., Agr. Chem. 22A. Coop. ARS

Fla. Physiological Responses of Florida Forage Crops to Environmental Variables. Learn interactions of temperature, light & associated radiation, water, nutrients and management on behavior of selected forage crops.
Agron. 743 (S-12)

Ga. *Supplementary Grazing Crops, Winter and Summer, for North Georgia*. To determine (1) plants furnishing greatest amount of high nutrient green weight under adverse summer droughts and winter cold, and (2) the limiting factors in production of a more nearly year-round grazing program.
Georgia Mountain Station, Forage 43. Coop. ARS, TVA

Hawaii *Cultural Practices with Tropical Crops*. To (1) determine response in terms of yield, grazing capacity or other performance to various plant nutrient or other treatments, (2) determine response to varying interactions of edaphic and treatment factors, and (3) translate yield performance and effects of treatment interactions into forms usable in economic agriculture.
Agron. 122.1

Hawaii *Rate, Direction and Intensity of Root Development of Forage Species in Tropical Soils*. Learn: (1) degree of root competition for P in a closed plant community; and (2) rate of root growth of some forage grasses and legumes.
Agron., Soil Sci. 138 (W-47)

Idaho *Determination of Causes of Poor Growth of Legumes in Northern Idaho*. To (1) find reason for poor growth of legumes in crop rotations used in Northern Idaho; and (2) attempt to increase growth of legumes by use of soil treatments, use of different strains of inoculation, or by combinations of the two methods.
Bact., Agr. Chem., Agron. 245

Ill. *Pasture Investigations. -- I. Adaptability and Productivity of Species and Varieties of Grasses and Legumes Under Soil and Climate Conditions at the Dixon Springs Experiment Station*. To study (1) adaptability of grasses and legumes to the soil and climate of Southern Illinois, (2) yields by mowing, hay production, seed production, nutritive value and persistence of important pure species, and (3) information necessary for intelligent procedure on larger pasture areas.
Anim. Husb., Dixon Springs 40-301

Ill. *Legume-Grass Mixtures for Hay Production*. To (1) determine effect of various grasses on prevention of heaving in alfalfa; (2) measure yield of grasses in combination with alfalfa, sericea, and birdsfoot trefoil; (3) evaluate grasses in combination with alfalfa, trefoil and sericea in weed control; (4) study longevity of above grasses with seven grass combinations; and (5) study establishment, yield, and survival of sericea, lespedeza alfalfa, and birdsfoot trefoil under different fertility levels.
Dixon Springs 40-303

Ind. Irrigation of Forage Crops in Indiana. Learn (1) water requirements of various crops of state and their responses as to yield, quality, and degree of disease under different soil moisture conditions, and (2) effect of various soil moisture conditions on root growth and nutrient uptake.
Agron., Bot., Agr. Engin. 823

Iowa Growth Responses of Forage Crops as Related to Environmental, Genetic and Management Factors. (1) Study effects of temperature, water and light, and their possible interactions, on the growing responses of varieties and selections of certain forage crop species, emphasizing: grass morphology-growth habit, tillering, leaf-stem ratio, top-root ratio; growth rate and dry matter production, duration of vegetative phase, and initiation and duration of reproductive phase; nature and extent of root development; chemical composition. (2) Learn effects of altering normal development of forage species, by cutting and other management practices. on recovery, persistence, and forage quality.
Agron., Bot., Pl. Path. 1321

Mass. Mineral Composition of Forage Crops as Influenced by Soils and Soil Treatments. To (1) study effect of soil, cultural management and fertilizer practice on yield and mineral content of certain forage crops, and (2) learn possibilities of maintaining stand and high yields of such crops having satisfactory mineral content thru management and fertilization.
Chem. 29

Maine Fertilization and Other Management Practices Affecting Yield and Persistence of Forage Legumes and Grasses. To (1) determine most desirable liming, fertilization, and other management practices for production and persistence of forage crops on representative Maine soils; (2) compare yield, quality, and persistence of pure stands of grasses vs. legume-grass associations under different management practices; and (3) correlate fertility responses with soil test results.
Agron. 32

Minn. Forage Crop Production and Management. -- 5. Hay Mixtures and Production Methods. To determine best techniques in establishment and management of grasses and legumes for pasture and hay.
Agron., Pl. Genet., Soils, Anim. and Dairy Husb. 1302-5.
Coop. SCS

Minn. Cropping Systems Based on Grassland Crops. To (1) learn how much of larger yield of crops which follow legume-grass sod is due to N contributed by the legume and how much by the sod, per se; (2) learn how long beneficial effects of sod last after it is plowed; and (3) evaluate new concepts of crop management such as growing green manures between widely spaced corn rows as compared with conventional systems.
Agron., Pl. Genet. 1321

Miss. Investigation of Methods of Seeding and Technique of Clipping Management to Obtain Maximum Forage Yields of Grasses, Legumes, or Mixtures of Grasses and Legumes. To determine (1) clipping technique best to maintain white clover in tall fescue and get maximum production of balanced mixture; (2) effect on production and survival of tall fescue and ladino in various width row spacings; (3) effect on production of row spacings of various perennial grasses and legumes, alone or combined; (4) effect of summer and fall management on survival and maximum production of perennial grasses and legumes; and (5) clipping management for maximum yield of forage and longer production period of small grain with different types of growth.
Agron. HC-12

Miss. Pasture and Forage Production Investigations. -- e. Comparison of Colloidal and Rock Phosphates with Superphosphate for the Establishment and Maintenance of a Legume and a Grass-legume Pasture. To determine value of phosphorus sources for the establishment and maintenance of pastures, as to total forage production, distribution of production during growing season, botanical composition of sward, and chemical composition of forage.
Agron. HC-14

Mo. Experiments in Crop Sequences -- c. Value of Different Legumes in Cropping Systems. To (1) determine yields of grain crops when they follow different legumes on soils of varied nutrient level; and (2) study effect of these different legumes on soil nutrient levels.
Soils 117-c

Mo. The Use of Water in the Production of Field Crops. To learn the effect of irrigation on yield and quality of (1) corn grown under different levels of fertilization, (2) cotton grown under different levels of fertilization, (3) soybeans, (4) pastures for beef cattle, and (5) forage crops.
Field Crops 204. Coop. ARS

Mont. The Response of Pasture Grasses and Legumes to Different Water and Nitrogen Levels. Learn adaptation of grasses and legumes to various water and N levels under simulated pasture conditions.

Agron., Soils 153, MS 962. Coop. ARS

Mont. Soil-Water-Plant Relations of Forage Crops with Different Water Table Levels. To determine (1) influence of different water table levels and other water management procedures on production and quality of hay and pasture on high altitude meadows; and (2) determine best fertilizer practice, soil amendments and cultural practices for maximum economic production of pasture and hay under various water management practices.

Agron., Soils MS 918 (W-29)

Nev. Management and Utilization of Irrigated Forages. To (1) learn effect of forage species and their management in amount, type and efficiency of animal gain per acre; (2) learn effects of grazing on productivity and longevity of forage plants; (3) learn type and amount of animal gain per acre from tall wheatgrass when utilized as pasture, hay or silage; and (4) develop suitable management practices for efficient forage production in Nevada.

Agron., Range Mgt. 46

Nev. Effects of Cultivation and Management Practices of Native Meadow Hay Lands on Yield and Feeding Value of Forage. (1) To increase the quantity and quality of hay produced on typical native hay meadow land to the maximum possible through the application of cultural and management practices. (2) To correlate costs of such practices on these lands with the increased returns to determine economic benefits or penalties. (3) To conduct the experiment in such a manner that it will serve as far as possible as a demonstration of results obtained in order to benefit students in agriculture, ranchers, and others.

Range Mgt., Agron. 74. Coop. SCS

Nev. Water Studies in Relation to Forage Crop Production in Southern Nevada. To determine (1) basic consumptive use of more important forage crops grown in Nevada, and (2) irrigation efficiencies practical and feasible under Southern Nevada conditions.

Agron. 89. Coop. ARS

N. H. Effect of Soil Type and Mineral Additions on the Mineral Content of Clover and Timothy. To determine factors affecting minor element content of New Hampshire forage, the duration of effectiveness of an application of a minor element, and the effect of various fertilizer practices upon this duration.
Agr. & Biol. Chem., Dairy Husb. 71

N. J. Nutritional Requirements of Certain Grasses and Legumes and their Response to Fertilizer Treatments. (1) Study response of alfalfa to various combinations of N, P. and K. (2) Determine rates and ratios of fertilizer best suited to alfalfa culture. (3) Investigate most effective time of year to fertilize alfalfa. (4) Study the relationship between cutting treatments and N applications regarding yield and persistence of bromegrass.
Farm Crops 264

N. Mex. Forage Production, Management, and Mixture Trials, with Irrigated Pasture Crops. To learn effect of various stimuli on yield and botanical composition of forage on grass-legume mixtures as (1) a. rate and frequency of N applications with constant P, b. frequency and closeness of harvest, c. spacing of mixtures of alfalfa and alta fescue and alfalfa and perennial ryegrass broadcast and in alternate rows, d. spacing of alfalfa overseeded with barley in fall and sudangrass in summer. (2) To learn with new strains, varieties and species of perennial grasses and legumes, a. performance, in observance nursery, of new strains and introductions, b. yield and composition of mixtures overseeded on Coastal Bermuda grass, c. response of Coastal Bermuda to varying rates of N, d effect of frequency and closeness of harvest on yield and root growth of Coastal Bermuda. (3) To learn yield and leaf percentage of most commonly grown sudangrass varieties.
Agron. 49

N. Y. (Cornell) An Investigation of Methods for Improving the Quality and Economy of Production of Feed Crops in the Principal Soil and Climatic Regions of New York State. -- IV. The Relation of Phosphorus to the Nutritional Quality of Forage Crops. To obtain more adequate information on the secondary effects of soil phosphorus on plant composition, apart from total yield; and to study root and aerial environments as an aid in predicting what can be expected on a given soil in different seasons.
Agron. 46-IV. Coop. ARS

N. C. Effect of Fertilization and Management on the Composition and Nutritive Value of Plants Commonly Used for Livestock Feeds. (1) Study effect of different fertilizers on composition of whole plants, soybeans, lespedezas, bull grass, ryegrass, and related forage plants, (2) make similar composition studies on various parts of soybean plants and other legumes, (3) study interrelationships of fertilization and maturity on composition of plants, (4) learn at intervals thruout grazing season, changes in chemical composition of grazed forages differently fertilized, and (5) study nutritive characteristics of plants by feeding and metabolism studies with laboratory animals.

Anim. Indus. H-17. Coop. ARS

N. C. The Fertility Requirements of Adapted Forage Plants. To (1) determine response of important forage plants of the area to rates and method of application of major and minor nutrients; and (2) study effect of such treatments and soil properties upon nutrient uptake, chemical composition, and nutritive value of the plants.

Agron., Soils 113

Ohio Crops and Practices for a Dairy Enterprise. (1) Learn if sudangrass should have a regular place in forage programs for dairy farms. (2) Compare feeding value of sudangrass silage with legume-grass silage for lactating dairy cows. (3) Evaluate experimental practice of establishing meadows in corn seeded in wide rows.

Agron., Dairy 34-3

Ohio Establishment and Maintenance of Forage Crop Stands. To (1) make investigations, fundamental and applied, relative to ecology and physiology of grass and legume seedlings, and (2) investigate phases of cultural management which affect growth and survival of an established stand of a forage crop.

Agron., Ent., Bot., Pl. Path. 45

Ohio Winter Injury to Crop Plants From the Indirect Effects of Low Temperature. (1) Learn more specifically the mechanics of the phenomenon of heaving, and the environmental conditions leading to its occurrence. (2) Study anatomical, morphological and physiological characteristics of species, and particularly of varieties, bearing a relation to their ability to survive conditions normally producing heaving.

Agron. 174 (NC-42)

Oreg. *Soil Fertility Problems Affecting the Production of Forage Crops in the Coastal Area of Oregon*. (1) Learn: short time effects of lime and individual nutrients alone and in combination, on yield, mineral composition, botanical composition, and seasonal production of forage crops grown in coastal area; optimum rate of application of several nutrients that must be added to produce the highest or most economical yields of forage; residual effects of applications of lime and plant nutrients om soil and fate of nutrients added to soil. Characterize the chemical properties of major soil series in coastal area. (2) Provide: data needed for calibration of soil and plant tissue tests including data on response of forage crops to fertilizer and lime; physical data on crop response needed for an economic analysis of use of fertilizers and lime.
Soils 255

Oreg. *The Role of Rhizosphere Bacteria in the Growth of Forage Plants and the Influence of Organic Residues and Nitrogen Fertilizers on their Development*. To learn (1) if important forage plants have a specific rhizosphere microflora, (2) if microflora is beneficial to plant, and (3) effects of crop residues and N fertilizers on rhizosphere microflora and its influence on selected forage plant species.
Bact. 282 (W-47)

Pa. *Evaluation of Grasses and Legumes for Hay, Grass Silage, and Pasture for Dairy Cows*. To (1) determine relative persistence and productivity of a number of grass-legume associations for silage followed by summer grazing, and (2) evaluate several management systems on an orchard grass-Ladino clover sward with respect to maintenance of legume and productivity of these forage species.
Dairy Husb., Chem. 1024-A. Coop. ARS

Pa. *Supplemental Irrigation for Maximum Production of Agronomic Crops*. To learn (1) effect of interaction between crops and soil management on frequency and amounts of supplemental irrigation required for maximum production, (2) effects of supplemental irrigation on yield and quality of agronomic crops, and (3) extent need for supplemental irrigation may be obviated by selection of drought tolerant varieties.
Agron., Agr. Engin. 1152D (NE-22). Coop. ARS

Pa. Maintenance Fertilization of Grasslands in Pennsylvania. To (1) study effect of different amounts and ratios of fertilizer on dry matter yields and maintenance of legumes in various grass-legume mixtures; (2) correlate soil tests and fertilizer applications with yields; (3) study effect of fertilizer nutrients on plant uptake and mineral content; (4) study effect of one element on plant uptake of it and other elements by grasses and legumes; and (5) study improvement in soils thru addition of nutrients applied as top dressing.
Agron. 1236-A

R. I. The Effect of Supplemental Irrigation on the Yield and Quality of Irish Potatoes and Forage Crops. To learn (1 - 5) level of soil moisture when supplemental irrigation should begin for maximum yields; (2) amount of irrigation water needed to bring soils from initial moisture levels to field capacity; (3) how often to irrigate to keep moisture within selected moisture range; (4) adjustment of fertilizer practice needed when using supplemental irrigation; (5) adjustment of fungicide and insecticide use necessary with supplemental irrigation. (6) Study local rainfall data with reference to needs for irrigation. (7) Compare devices for measuring soil moisture with dry weight lab. method.
Agron., Pl. Path., Ent. 208 (NE-22)

R. I. Comparison of Nitrogen Fertilizers for Grass and Grass-Legume Forage Mixtures. Learn (1) value of several N carriers applied to grasses and grass-legume mixtures for forage production; (2) effect of N fertilizer applications on botanical composition of grass-legume mixtures. (3) Measure N recovery in treated forage. (4) Compare weight gains of dairy heifers on N-fertilizer pasture mixtures.
Agron., Anim. Husb., Dairy Husb., Agr. Chem. 216

R. I. The Influence of Management on Yields and Persistence of Legumes in Pasture Mixtures. To learn (1) relationship between yields, botanical composition and persistence of alfalfa and ladino clover planted together in association with bromegrass under clipping treatments simulating several intensities of grazing, and (2) effect of N on yields and botanical composition under several clipping treatments.
Pl. Physiol. 704

S. C. Roughages for Dairy Cattle. Learn effect of increased rates of fertilization of fescue pasture on palatability, yields and milk production. (2) Evaluate Coastal Bermuda grass for pasture, hay, and silage. (3) Study value of selected plants in a dairy cattle program.
Dairy, Agr. Chem. 103

S. C. Drainage and Fertilizer Requirements of Forage Crops Grown on Coastal Plains Soils. To learn (1) relation of degree of drainage of certain soils to growth of various forage crops, and (2) fertilizer requirements of these crops on recently drained Coastal Plains soils.
Agron. 124

Tenn. The Effects of Various Management Variables on the Establishment and Development of Orchardgrass, Tall Fescue, White Clover and Alfalfa. To (1) evaluate various methods of band seeding of grasses and legumes; (2) determine effect of seeding rates on plant development; (3) investigate competitive forces developing between and within species when seeded at various rates; and (4) determine effect of height of cutting on plant survival at different soil moisture and temperature levels.
Agron. 46 (S-12)

Tex. Forage Production. To (1) determine suitability of species combinations and appropriate methods for establishment, maintenance and management of these combinations for use in permanent and temporary pastures and meadows, using various plot techniques to measure suitability of species combinations and methods being tested -- A. Combination of species, including compatability studies, and fertilizer requirements; B. Establishment, including fertility practices, seedbed preparation and seeding methods, and rate and time of seeding; C. Management, including clipping at what time, height, and stage of maturity, and mixtures; and D. Maintenance, including weed control by mowing, chemicals, etc., and fertility practices; (2) determine most efficient methods to use in renovating permanent pastures as follows: cultural practices, fertilizer treatments, reseeding, use of legumes, and drainage; and (3) determine most productive varieties and strains of forage plants to use for silage.
Agron., Anim. Husb. 388. Coop. ARS

Tex. Forage Production as Affected by Applied Nutrients. To study (1) effect of time, rate, ratio, source, and placement on efficiency of applied nutrients on: pure stands of grasses or legumes, mixed stands of grasses and legumes, native pasture mixtures; (2) effect of added nutrients on chemical quality, botanical composition, and feeding value of forage to animals; and (3) above points with or without supplemental irrigation in humid area of state and with irrigation in most arid area.
Agron., Soils 573. Coop. ARS

Tex. Growth and Management Studies with Selected Forage Species. Obtain information on growth phenomena (above and below-ground development) of selected grasses and legumes over their life history under Texas climatic conditions; study effect of management treatments (e.g., harvest stage, date, frequency and height; cultivation; nutrient level and placement; and irrigation) on growth phenomena of plants.
Agron. 721 (S-12) Coop. ARS

Va. Compatability of Forage Species in Mixtures. To study botanical composition, longevity of species and yields as related to: 1. seedling growth development of different phenotypes and species of forage plants in pure stands and mixtures when grown under various environmental growth factors; and 2. compatability of grasses and legumes grown in mixtures with different seeding ratios and species components.
Agron. 86036

Wash. Forage Crop Management and Evaluation. To (1) evaluate varieties and selections of forage crops for forage and seed production; (2) study effect of various combinations of grass and legumes, methods of seeding, and stage of maturity on yield, chemical composition and root production; and (3) study influence of time of harvest and fertilizer applications on yield and chemical composition of pasture herbage.
Agron. 1181. Coop. ARS

W. Va. The Influence of Fertility and Management on Several Ladino Clover-Grass Mixtures. To (1) determine yield of Ladino clover grown alone and in association with bromegrass, Reed canary grass, orchardgrass, and Kentucky 31 fescue; (2) determine effect of various fertilizer applications on stand, yield, botanical and chemical composition of various combinations of Ladino clover-grass mixtures; (3) determine effect of management on stand, yield, botanical and chemical composition of mixtures; (4) evaluate compatability of mixtures; and (5) study longevity of stand as influenced by fertility and management.
Agron., Genet. 19

W. Va. The Influence of Several Management Practices on Performance of Alfalfa and Ladino Clover Grown Alone and In Association with Grasses. To (1) ascertain effect of time of spring and fall cutting dates, with full insect control, on yield, botanical composition, and persistence of alfalfa varieties and mixtures as well as Ladino clover and mixtures; (2) study influence of cutting management on quality of forage produced; (3) study disease incidence, if present, as affected by cutting management; and (4) investigate influence of soil moisture and temperature and air temperature on management of alfalfa, alfalfa-grass and Ladino clover, and Ladino clover-grass mixtures.
Agron., Genet. 68 (NE-29)

Wis. Winter Injury of Leguminous Crops in Northern States. Study causal factors and effects involved in winter injury of legumes and make basic studies regarding physiology of plant as related to overwintering, influence of climatic and edaphic factors involved in survival, and development of techniques for more rapid and dependable evaluation of new varieties or species.
Agron. 303

Wyo. Irrigation Criteria for Forage Crops. To determine (1) maximum tension to which soil at particular depth may dry without significantly reducing forage yield; (2) at which horizon yield most closely correlates with mean peak tension; and (3) effect of deep phosphate placement on moisture removal from subsurface horizons, and any change in relation of tension to yield for specific horizons.
Agron. 558 (W-29)

B. Grasses

Hawaii The Form of Nitrogen in Grasses Following Nitrogen Fertilization. To (1) determine forms and distribution of N in Panicum and Napier grasses, and (2) study relationship of N to phosphorus and potash in Napier grass.
Agron., Soils, Agr. Chem. 622.5

Ind. Factors Which Influence the Yield of Cool Season Grasses. (1) To learn relative vigor of regrowth of bromegrass when harvested at low and high fructan levels. (2) Study rate of accumulation of fructan in grass as affected by temperature, time of N fertilization with respect to harvesting, and soil moisture. (3) Learn nature and extent of fructan depletion in cool season grasses during and following anthesis.
Agron., Statis. 837

Md. Response of Orchardgrass to Various Rates and Ratios of Potassium and Nitrogen Fertilization. Study: (1) interrelationship of K and N on nutrition of orchardgrass; (2) effect of K and N on yield, longevity of stand and chemical composition of orchardgrass. (3) Learn what K contents in harvested forage are critical for maximum yield and stand persistence.
Agron. 0-59

Miss. Pasture and Forage Production Investigations. -- a. Evaluation of Coastal Bermuda Grass: Methods of Establishment, Legume Associations, and Response to Fertilization and Irrigation. To (1) study methods of establishing Coastal Bermuda grass in established sod without complete seedbed preparation, and on well-prepared seedbed; (2) determine most effective rate of N for production of Coastal Bermuda grass hay and pasturage; (3) determine compatability of several Coastal Bermuda grass-legume combinations; and (4) determine production potential of Coastal Bermuda grass under irrigation with high rates of N.
Agron. HC-10

Miss. Establishment and Maintenance of Dallisgrass in Bermuda Grass Sod. To learn (1) amount of seedbed preparation needed for re-establishment of Dallisgrass in Bermuda grass sod; (2) best season for seeding Dallisgrass in Bermuda grass sod after different methods of seedbed preparation; and (3) competitive effect of legumes planted with Dallisgrass in Bermuda grass sod.
Agron., Crops HC-13

Miss. Pasture and Forage Production Investigations. -- d. Response of Fescue and Fescue-Ladino Clover to Levels of Potash Fertilization. To determine (1) optimum level of potash for production of fescue and fescue-ladino clover; (2) level of potassium in plant tissue required for optimum physiological functioning; (3) range of potassium in plant tissue which might be termed "luxury consumption"; and (4) level of potassium in plant above which a depression of physiological functioning might occur.
Agron., Crops HC-15

Miss. Small Grain Production as Affected by Fertilizer Rates, Fertilizer Placement and by Stand. To learn efficiency of phosphate for (1 and 2) forage production as affected by banded and broadcast applications, and by ammoniation. Delta Red 88 oats will be used for forage. Victorgrain oats, Anderson wheat, and Kenbar barley to be used; (2) grain production, as affected by time and method of application. (3) Learn yield of grain and extent of lodging as affected by conventional row seeding and restricted broadcast seeding at variable rates of seeding and at varying N levels.
Agron., Soils HD-5

Miss. Production, Fertilization, Management, and Utilization of Johnson Grass. To develop sound practices for production of Johnson grass.
Agron. HU-1

Nebr. <ins>Effects of Fertilization Practices on the Yield, Chemical and Botanical Composition, and the Feeding Value of Upland Prairie Hay in Southeastern Nebraska</ins>. To (1) determine effects of different fertilizer elements alone and in combinations on yield and chemical composition of upland prairie hay; and to study interactions between chemical characteristics of soils and effects of fertilizers; (2) study effects of fertilization practices on botanical composition of meadow vegetation, particularly on relative abundance of Kentucky bluegrass and cool season sedges; and (3) determine effects of a few or most promising fertilization practices on the feeding value of upland prairie hay.
Agron. 466

Nebr. <ins>Irrigated Bromegrass, Tall Wheatgrass, and Intermediate Wheatgrass as a part of the Ration in Milk Production</ins>. To learn (1) comparative value of irrigated bromegrass, tall wheatgrass, and intermediate wheatgrass as measured by: forage yields, production of 4% FCM, cow days of grazing per acre, gain or loss in body weight of animals grazed, (2) number of pasture days of each grass, with supplemental feeds, needed to produce 100 lbs. of milk, and (3) comparative recovery ability after grazing of the three grasses when used for irrigated pastures.
Dairy Husb., Agron. 564

N. H. <ins>The Influence of Fertilization and Stage of Cutting on the Yield, Persistency and Protein Content of Bromegrass (Bromus Inermis)</ins>. To determine yield of dry matter and protein per acre as well as persistence of bromegrass stands when grown at three levels of N fertilization and cut at three physiological stages of growth.
Agron. 69

Pa. <ins>Forage and Grain Production of Winter Small Grains as Influenced by Fertilization and Management Practices</ins>. To investigate: (1) value of winter small grains as dual purpose crops, (2) management and fertilization practices for maximum forage production with minimum reduction in grain yields, (3) nutritional value of forage produced, and (4) if animals grazing such grains cause harmful soil compaction.
Agron., Agr. and Biol. Chem. 1124

Pa. <ins>Productivity of Grasses Grown in Controlled Legume Associations as Compared to Grasses Grown Alone with Nitrogen Fertilization</ins>. To (1) measure N supplying power of various legumes in association with grasses and factors affecting this association; (2) determine effects of adding N on quantity and quality of grasses; and (3) add information on role of N in grassland program of Pennsylvania.
Agron. 1236-C

S. C. Irrigation of Coastal Bermuda Grass. (1) Learn difference in yields between irrigated and unirrigated Coastal Bermuda grass. (2) Study effect of N applications on production and value of Coastal Bermuda grass.
Dairy , Chem. 106 (S-12)

C. Alfalfa

Ariz. The Effect of Length of Day and Cultural Methods on the Reproductive Potential of Alfalfa. (1) Evaluate reproductive response of northern and southern alfalfa varieties to long and short photoperiods. (2) Learn influence of cultural and environmental factors on physiology of seed production in alfalfa.
Agron., Range Mgt. 367 (W-58)

Colo. The Effect of Alfalfa, Plant Nutrients, and Moisture Level on Crop Production Under Irrigation in Colorado. To learn (1) effects of alfalfa and plant nutrients on the yield and quality of crops grown in a rotation, and on the chemical and physical characteristics of the soil; and (2) effects of moisture level, plant nutrients, and plant population on the quality and yield of crops.
Agron. 11

Colo. The Use and Management of Seeded Range Units. Compare productivity of range units seeded to grass with units seeded to a mixture of grass and alfalfa. Learn ability of various strains of alfalfa planted in a mixture with grass to withstand grazing; management procedures needed to maintain alfalfa in a grass-alfalfa mixture.
Forage and Range, Anim. Invest. 145

Colo. Vascular Tissue Differentiation in Alfalfa Roots as Influenced by their Ionic and Physical Environment. Investigate vascular tissue differentiation of alfalfa roots grown in lab and greenhouse in soils providing the following environmental conditions: variation in ratios of adsorbed Ca and Na; in type and amount of soluble salts; in degree of aggregation of soil particles.
Agron. 202 (W-47)

Ga. Effects of Potash, Borax, and Other Fertilizer Elements on the Yield, Composition, and Longevity of Alfalfa. To determine (1) most efficient rate of fertilization for highest hay yields, quality and most persistent stands, and (2) best method of fertilizer placement.
Agron. 38

Idaho Sulfur Studies on Crops in North Idaho Using Radioactive Sulfur. To (1) compare availability of sulfur to alfalfa, wheat and peat from two main sources, elemental sulfur and gypsum; (2) determine extent of sulfur uptake by those crops at various stages of growth; (3) determine distribution of sulfur; (4) determine effect of sulfur treatments on crop yields; (5) test "A" value concept for sulfur in those crops; and (6) carry over into the second year using alfalfa and peas as crops.
Agr. Chem. 208

Idaho Soil and Moisture Studies on "Sick" Alfalfa Using Radiotracers. Learn (1) effect of soil moisture and soil physical condition on availability of nutrients; and (2) patterns of soil moisture movement to observe moisture penetrability.
Agr. Chem., Agron. 328

Ill. Effect of Fertilization on Longevity and on Yields of Alfalfa. Study the possibility and desirability of lengthening productive life span and yield of alfalfa stands by fertilization on Grantsburg silt loam.
Dixon Springs 40-337

Ind. The Effects of Insects, Insecticides, and Cultural Practices on the Quality and Quantity of Forage and Seed Yields of Alfalfa. To study (1) effects of new insecticides on insect populations and on alfalfa plant yields and quality; (2) seed production as influenced by various cultural methods as seeding, overhead irrigation, and blooming dates as influenced by time of cutting; and (3) pollinators as affected by chemicals to control injurious insects and determine time that most beneficial pollinators are at a maximum so that alfalfa crop can be planned to coincide with the period.
Agron., Ent. 510

Kans. The Roles of Zinc and Iron in Alfalfa and the Composition of Zinc Containing Substances in Alfalfa. Learn nature of chemical substances in plants to which Zn is bound, rate of uptake of Zn by plants grown in nutrient solutions, under various conditions and the relationship of Fe and Zn in plants, if such exists.
Chem., Bot. 328

Ky. Physiological Investigations of Red Clover. Obtain basic physiological information which will aid in improvement of red clover.
Agron., Pl. Physiol. 171. Coop. ARS

Md. Alfalfa and Alfalfa-Orchardgrass Management. To (1) determine forage yield, feeding value, and stand persistence of alfalfa alone and with bromegrass as affected by a. stage of growth at first harvest in spring, and b. different harvest dates for last fall crop; (2) provide information in cooperation with other states under NE-29; and (3) gain basic knowledge for selecting best treatment combinations for use in growing larger plots for actual feeding trials.
Agron. B-56-n (NE-29) Coop. ARS

Md. Alfalfa Fertilizer Practices. To (1) study fertilizer rates and ratios in reference to soil type and time of application, (2) compare a single application once in three years with annual applications, both having same amount of total fertilizer applied in a three-year period, (3) study spring applications of commercial fertilizer, just as visible growth starts, vs. fall applications of commercial fertilizer on alfalfa in early September, after last cutting, and (4) study minor elements when and where evidence indicates they are limiting yields.
Agron., Soils 0-51

Md. The Effect of Various Rates and Frequencies of Potassium Applications on Yield, Persistence and Chemical Composition of Alfalfa and Alfalfa-Orchardgrass. (1) Learn most efficient time and rate of applying K to alfalfa and alfalfa-orchardgrass. (2) Study how alfalfa and alfalfa-orchardgrass stands differ in their K requirements. (3) Learn what K contents in harvested forage are critical for maximum yield and stand persistence.
Agron. 0-60

Minn. Alfalfa Improvement for Minnesota Conditions. -- 2. Seed Production Studies. To study problems of breeding and produce varieties adapted to Minnesota, to determine better methods of seed production with particular emphasis on agronomic problems, and to carry out varietal trials.
Agron., Pl. Genet. 1319-2

Mo. Soil Treatments for Alfalfa. To determine (1) fertilizer treatments and soil management practices to increase alfalfa production; and (2) soil treatments for alfalfa grass mixtures.
Soils 242

N. Dak. Effect of Fertilizer on Selected Farm Crops Grown Under Irrigation on a Number of North Dakota Soils. To (1) obtain data to provide basis for sound recommendations for use of fertilizers on alfalfa; (2) obtain data on fertilizing corn and small grains used as nurse crops for legume or legume-grass seedings; and (3) relate results of treatment to profile characteristics such as texture, available phosphorus, pH, organic matter, lime and soluble salt content.
Soils 15-5

Okla. The Effect of Rate of Seeding, Spacing, and Fertilization on Alfalfa Seed and Hay Production. To determine (1) relative effectiveness of kinds and amounts of commonly used phosphate fertilization materials alone, and combined, on growth of alfalfa; (2) interaction of various plant nutrient levels influencing alfalfa yields to determine most efficient level of fertility to be maintained with commercial fertilizer; (3) secondary and trace element requirement of alfalfa in Oklahoma soils; (4) soil fertility requirement of alfalfa grown with warm and cool season grasses under irrigation; and (5) performance and production of alfalfa and grass combination under irrigation when used primarily for irrigated pasture.
Agron. 680

R. I. Productivity, Persistence, and Feeding Value of Alfalfa and Ladino Clover as Influenced by Management Differentials. To (1) determine effect of the following factors on forage yield, feeding value and stand persistence of alfalfa and ladino clover when grown alone and with grass: a. stage of growth at time of first harvest in spring; and b. different times of harvesting the last crop in the fall; (2) determine influence of a range of environmental conditions under which these plants are grown on their response to differential cutting treatments; and (3) gain basic information for selecting best combinations of treatments to be used in growing larger plots for actual feeding trials.
Agron., Pl. Path., Engin., Chem. 215 (NE-29) Coop. USDA

S. C. Nutrient Applications as Affecting Yield, Longevity of Stand, and Chemical Composition of Alfalfa. To determine (1) yield response from applications of boron and boron with copper, manganese, zinc, and molybdenum; (2) most satisfactory stage of growth for harvesting; and (3) most favorable treatments and practices affecting longevity of stand.
Agron. 114

S. C. Physiological Relationships of Clovers. (1) Study physiology of clovers, involving effects of temperature, moisture, light, and nutrition on establishment, growth, defoliation, seed production and survival of clovers including absorption, translocation, respiration, photosynthesis, chemosynthesis, plant composition, etc. (2) Learn physical interactions as related to incidence and destruction of different diseases. (3) Develop screen methods and techniques to obtain resistance to unfavorable environmental factors and for freedom from undesirable plant constituents giving objective to breeding, culture, management, and seed production research.
Bot., Bact. 328. Coop. ARS

W. Va. Maintaining Profitable Stands of Alfalfa. To (1) evaluate soil conditions and disease and insect damage on established fields of alfalfa and relation to yield and longevity of stand; (2) learn effect of placement and amount of nutrient elements on establishment, yield, and longevity of alfalfa stands; and (3) learn effect of soil fungicides and insecticides on establishment, yields, and longevity of alfalfa stands.
Agron., Pl. Path. 50

D. Clovers

Miss. Physiological and Environmental Factors Affecting Stand Growth and Seed Production of Some Adapted Forage and Pasture Crops. To (1) investigate seed production of adapted forage and pasture plants as affected by length of photoperiod, temperature, and humidity; (2) learn time of emergence of crimson clover seedlings sown at different dates; and (3) learn effects of weather conditions on survival of crimson clover sown at different dates.
Agron. RRFC-2 (S-12) Coop. USDA

N. Dak. Soil Fertility, Crop Rotation, and Sweet Clover Management Trials. To (1) compare various cropping systems and influence of manure produced by each; (2) study values of superphosphate, ground limestone, and sulfate of potash in livestock and grain farming systems; (3) compare steamed bone meal, ground raw rock phosphate and superphosphate as carriers of phosphorus; and (4) manage sweet clover in a rotation in preparing the land for wheat.
Agron., Soils 6-4

Ohio Spring and Fall Management of Ladino Clover and Birdsfoot Trefoil. To determine (1) effect of early spring grazing on stand and yield of birdsfoot trefoil and Ladino clover; (2) effect of fall grazing on stand and yield of birdsfoot trefoil and Ladino; and (3) interaction of spring and fall treatments.
Agron. 34-2

R. I. *Physiological Factors Determining Persistence of Ladino White Clover in Rhode Island*. Learn basic cause(s) why Ladino white clover is subject to "winter-kill". Devise means of preventing injury.
Pl. Physiol. 705

W. Va. *The Cause and Remedy for Red Clover Failures in West Virginia*. To (1) determine cause of failures of red clover hay and seed crops and devise remedies, and (2) investigate factors found primarily responsible for these crop failures.
Agron., Pl. Path. 51. Coop. USDA

E. Minor Legumes

Miss. *Studies on the Production of Lespedeza Hay*. To learn (1) best adapted varieties of annual lespedeza and other hay crops, (2) proper seedbed preparation and time of seeding annual lespedeza, (3) best method of weed control by clipping and chemical sprays, and (4) when to cut and how many times to cut Kobe and a Korean strain of lespedeza to produce profitable hay yields and sufficient seed for volunteer reseeding the following years.
Agron. HT-1

N. Y. (Cornell) *Birdsfoot Trefoil Investigations. -- 1. Culture and Management of Birdsfoot Trefoil for Hay, Pasture, and Silage*. To determine value, adaptation, and principles of use of birdsfoot trefoil as a forage legume for areas where other legumes give inferior performance as pasture or hay and to develop methods and practices for successful culture of this legume as an aid to economy of the livestock industry.
Agron., Nutr., Pl. Brdg., Anim. Husb., Engin. 47-1

Pa. *More Efficient Rhizobium for Inoculating Birdsfoot Trefoil (Lotus corniculatus)*. Improve methods for maintaining inoculum titer in soil. (2) Study interactions in soil between rhizobia and other members of soil microflorae. (3) Obtain strains of rhizobia that will more rapidly cause effective nodulation. (4) Study physiology of symbiotic nitrogen fixation in *Lotus corniculatus*.
Bact. 1336

Vt. *Effect of Simulated Pasture Management Practices on the Persistence, Quality, and Yield of Several Birdsfoot Trefoil Species and Varieties*. Evaluate yielding ability, quality, and persistence of stand of several trefoils maintained under different simulated pasture management systems.
Agron. 30

III. FORAGE CROP HARVESTING AND STORAGE

Ariz. Influence of Forage Harvesting and Feeding Methods on Beef Production. To (1) study most efficient method of harvest of forage crops in a livestock feeding program, (2) learn relative amount of beef produced per acre of land, as influenced by method of harvest, and (3) ascertain effects of harvest methods upon agronomic phases of the program such as botanical composition, stand longevity, weed infestation, and fertilizer needs.
Agron., Anim. Sci., Range Mgt. 248

Mich. Producing, Harvesting, Curing and Storing of Legume, Grass, Cereal, and Other Hay or Silage of High Protein and High Energy Value. (1) Economically develop ways to preserve crop feeding value, by avoiding losses due to management, poor fermentation, mold, and poor animal-acceptance. (2) Promote in silage better fermentation of forages cut at optimal times and in hays better preservation of nutrients. (3) Grow, harvest, and preserve high yields of high quality forages, high in protein, yield, T.D.N., from whatever source or method. (4) Learn principles involved in either case in growth, management and preservation.
Farm Crops, Dairy, Microbiol. 48

Nebr. Factors Affecting the Drying Rate and the Compaction Characteristics of Alfalfa Hay. (1) Obtain vapor pressure characteristics of harvested alfalfa plants, and components at different temperatures and moisture contents. Learn: (2) effects of cutting, crushing, and heating on vapor pressures of alfalfa plants, leaves, and stems; (3) compression characteristics of plants, leaves, and stems at different moisture levels and influence of physical treatments on characteristics.
Agr. Engin., Biochem. 598

N. Y. (Cornell) A Study of the Sources and Control of Nutritional Losses Occurring During the Harvesting and Storage of Hay and Silage. To learn (1) relative magnitude of nutritional losses occurring as a result of respiration, leaching, leaf shattering, and other causes when various forage crops are made into hay and silage; (2) ways of minimizing field and storage losses when forage crops are made into hay and silage; (3) better methods of producing high quality roughage from hay crops.
Agron. 51

Ohio

A Comparison of Upright and Prostrate Broadleaf Birdsfoot Trefoil Under Grazing with two Management Systems and two Species of Grazing Animals. To learn (1) if upright or prostrate varieties of broadleaf birdsfoot trefoil are more productive under grazing; (2) effect of species of grazing animal on productivity and longevity of types of broadleaf birdsfoot trefoil; (3) effect of grazing management on longevity and productivity of types of broadleaf birdsfoot trefoil.

Agron. 161

Pa.

Methods of Preservation and the Measurement of the Nutritive Values of Forage Crops. -- B. The Type of Storage of Grass Silage as Affecting Nutritive Value (and Losses). To compare effectiveness of upright silo, silo stack, and trench silo in retaining nutrients of grass silage, with and without preservatives.

Anim. Husb., Anim. Nutr. 1016-B

Pa.

Methods of Preservation and the Measurement of the Nutritive Value of Forage Crops. -- C. The Losses of Nutritive Value of Grass Silage in Tower Silos as Affected by Method of Preservation. To determine losses from silo from seepage and from fermentation and evaluate effectiveness of use of sodium metabisulfite, wilting and absorbers in reducing losses.

Anim. Nutr., Dairy Husb. 1016-C

Vt.

The Relationship of Date of Cutting to the Nutritive Value of Various Forages. Learn digestibility of energy and N (1) of first-cutting of various mixtures grown in state when harvested on June 9 and July 15; (2) of aftermath growth when cut at various intervals. (3) Further investigate use of chromium oxide as an indicator of digestibility of hays and silages consumed by lactating dairy cows. (4) Learn effect of fertilization on digestibility of energy and N of forages cut at various stages of growth. (5) Develop pure stands of grasses and legumes found in majority of recommended forage mixtures of state to learn digestibility of energy and N when cut at various stages of growth.

Anim. and Dairy Husb. 66 (NE-24)

Wis.

Yields from Forage Crops Under Different Systems of Dairy Cattle Feeding. To compare net returns from forage crops fed to dairy cows under different systems of handling and feeding, particularly during summer months.

Agron., Dairy Husb., Agr. Engin., Econ., Soils 910.
Coop. USDA

IV. FORAGE PROCESSING AND UTILIZATION

Ala. Productive Performance of Dairy Cows on Some Common Forages. To (1) determine dry matter intake and digestibility of organic matter of several common forages by mature dairy cattle; (2) identify factor(s) that affect consumption and digestibility of forage dry matter; and (3) study lactation stimulating qualities of common forages.
Dairy Husb. 537

Alaska Production, Processing and Preservation of Alaska Roughage. To (1) determine feeding value of barn-dried hay and silage fed independently and in combination, (2) compare peas and oats silage and barn-dried hay with bromegrass silage and barn-dried hay, (3) compare feeding value of peas and oats and bromegrass silage made in conventional way with the same crops preserved as baled silage, and (4) develop inexpensive methods of drying hay by forced air, by stacking partially cured hay on a false tunnel.
Anim. Husb. 22

Ariz. The Evaluation and Utilization of Low Quality Roughages as Feeds for Livestock in Arizona. To evaluate by chemical analyses, digestibility trials, and palatability studies, roughages and by-product feeds present in Arizona and which possess nutrient deficiencies and palatability limitations. Learn effective and economical methods for efficient utilization of these low quality roughages.
Anim. Indus., Dairy Indus., Agron. 388. Coop. SESD

Ark. The Evaluation of Forage and Other Nutrients for Sheep. To (1) evaluate forage commonly available for sheep production in South on which adequate experimental information is lacking, (2) study effects of certain micro-nutrients on utilization of forage materials, (3) study influence of certain nitrogen concentrates on efficiency of roughage utilization by sheep.
Anim. Indus., Vet. Sci. 400

Ark. Investigation of Improved Rations and Roughage Utilization by Dairy Cattle. Learn nutritive value of different kinds and qualities of Arkansas forage for dairy animals. Realize greater utilization of forages in rations by improving quality of forage, by better methods of forage preservation, and using rations containing forages in combination with various supplementary materials.
Anim. Indus., Vet. Sci. 402

Del. Nutritive Evaluation of Forages. To determine (1) yield of digestible nutrients of forage crops cut at various stages of maturity and produced under different management procedures, (2) yield of digestible nutrients when various forages are grazed or when various systems of grazing are used, (3) if the rabbit can be used to test the digestibility of forages which are produced to be consumed by other species.
Anim. and Poultry Indus. 42-AI (NE-24)

Ga. Locally Grown Forages in the Dairy Ration. To study (1) characteristics of forages which permit or inhibit stimulation of milk production; (2) effects of pasture management in maintaining and using forage possessing desired characteristics; and (3) need for type needed and effect of supplemental feeds with various forage types and pasture conditions.
Chem., Anim. Indus. 56

Ga. Techniques for Forage Evaluation with Dairy Cows. To (1) determine measure of quality which are indicators of a forage having ability to influence milk production; (2) investigate relative usefulness of available forage evaluation techniques and make necessary additions or changes to provide suitable techniques; and (3) study such interactions as quantity of forage, animal grazing behavior, forage chemical composition, and nutrient inter-relationships with animal performance.
Anim. Indus. 58 (S-12)

Ga. Effect of Various Methods of Handling, Preserving and Feeding Forages as Silage Upon Their Nutritional Value as Dairy Cattle Feed. To (1) evaluate ensiling practices currently used; (2) determine effect of adding preservative on nutritional value and dry matter conservation; (3) develop more adequate analytical procedures to evaluate silages; (4) determine effect of various additives on consumption rates of relatively unpalatable silages, and (5) compare feeding value of hay and silage made from same forage when fed as total or as a supplementary roughage to milking cows.
Dairy 323

Hawaii The Conversion of Forages and By-Products Grown or Produced in Hawaii into Palatable and Nutritious Silage and the Determination of the Nutritive Value, by Actual Feeding Trials, of Ensilage Produced from the Most Promising Materials and Procedure Developed. (1) To develop, by feeding trials, the best and most economical rations for dairy animals, using the most promising and economical silages of strip cane, legume and non-legume crops developed under subproject I to as great an extent as possible in replacing imported concentrates; and (2) to learn, by feeding trials, the economy of pen-fattening of beef on the most promising and economical silages of strip cane, legume and non-legume crops developed under subproject I with and without the use of imported concentrates.
Anim. Husb. 275

Hawaii *Biological Assay of Tropical and Subtropical Forage Crops*. To determine species of forage crops, especially of the tropics and subtropics, which result in either a beneficial or harmful effect on chicks.
Poultry Husb. 424.2

Ill. *Silage Crops for Dairy Cattle*. To compare Southern varieties of corn with those in this section and prolific with non-prolific types of corn for silage, seeking a type which will combine large yields of dry matter per acre with good keeping qualities and feeding value as silage.
Dairy Sci. 35-309

Ill. *Utilization of Roughages by Dairy Cattle*. To provide fundamental information on optimum nutritive conditions for use of forages by dairy cattle and on value of various roughages in feeding dairy cattle.
Dairy Sci. 35-314 (NC-25)

Ill. *Silage Made From Component Parts and the Whole of Various Plants*. Study: (1) Contribution which component parts and combinations of parts of various plants can make to rations of beef cattle and sheep; (2) problems of preservation associated with making various parts into silage; (3) types of storage suitable for different silages. (4) Correlate various silages with various beef cattle and sheep-feeding programs.
Dixon Springs 40-338

Ind. *Factors Influencing the Fermentation and Utilization of Legume-Grass Silage*. To determine (1) physical and physiological factors influencing grass silage fermentation; and (2) degree of utilization of selected silages *in vitro* and *in vivo*.
Dairy Husb. 771

Ind. *The Improvement of Procedures for the Evaluation of Forages*. To (1) determine quantitative relationships between clipping procedures and results obtained from grazing trial for measuring output per acre; (2) determine if there are interactions between harvesting methods, both animal and non-animal, and species, strains, and associations of two or more species; (3) explore use of artificial rumen to determine digestibility of nutritionally important components of forages; and (4) study magnitude and nature of experimental errors in various methods of measurement and with units of measure usually recorded in evaluation processes.
Agron., Dairy Husb., Biochem. 744 (NC-11)

Ind. *Effect of Maturity and Harvesting Procedure on the Chemical Components and Digestibility of Alfalfa and Orchard Grass*. To learn effect of: (1) maturity on content of lignin, cellulose, hemicellulose and soluble sugars in alfalfa and orchard grass; (2) cutting, drying, and ensiling of alfalfa and orchard grass on content of lignin, cellulose, hemicellulose and soluble sugars; (3) cutting, drying, and ensiling of alfalfa and orchard grass on solubility of hemicelluloses; (4) cutting, drying, and ensiling on feeding value of alfalfa and orchard grass.
Anim. Husb., Dairy Indus., Agron., Biochem. 915 (NC-25)

Kans. *Fundamental Nutrition Studies of Sorghum Roughages and Grains. -- II. A Study of the Digestibility of Sorghum Silage*. To learn the coefficients of digestibility of sorghum silage when fed alone and in conjunction with a high-protein concentrate.
Anim. Husb., Chem. 222-2

Kans. *Nutritive Value of Forages as Affected by Soil and Climatic Differences*. To study (1) differences in nutritive value of forages as affected by variations in fertility and other characteristics of soils; and (2) effects of climatic factors.
Anim. Husb. 430

Kans. *Measures of Efficiency of Roughage Utilization and Nutritional Factors Affecting Roughage Utilization Under Various Controlled Conditions*. (1) Devise measures of efficiency of roughage use by dairy cattle. To learn (2) variations existing among cows in ability to use roughage in rations, (3) environmental and physiological factors affecting efficiency of use of roughage by cows, (4) relationship of relative proportions of feedstuffs to efficiency of use of roughage by cows, and (5) relationship of level of protein, minerals, and other nutrients on efficiency of use.
Dairy Husb., Agr. Econ. 431

Ky. *A Comparison of Various Grass Silages as Roughages for Pregnant Ewes*. To determine relative merits of grass silages from Kentucky 31 Fescue and from a mixture of Kentucky 31 Fescue and Ladino clover.
Anim. Indus. 253

Ky. *A Comparison of the Nutritive Values of Orchard Grass, Smooth Bromegrass and Varieties of Tall Fescue*. To determine the digestibility, palatability and nutritive value of new varieties of tall fescue in comparison with Kentucky 31 fescue, and with orchard grass and smooth bromegrass.
Agron., Dairy 1005

Maine Roughage Preservation under Maine Conditions. To (1) study relative preservation of dry matter, protein, and carotene in grass silage, barn-cured hay, and field-cured hay on an acre basis, and (2) determine relative milk production obtained from an acre of grassland when forage is preserved as grass silage, barn-cured hay and field-cured hay.
Agr. Chem., Anim. Indus. 70

Maine Nutritive Evaluation of Timothy Hay Grown with Various Levels of Nitrogen Fertilization. Learn (1) digestible energy and digestible protein content of 1st cutting timothy hay grown under various levels of N fertilization and harvested at full-head stage; (2) total protein, ether extract, ash and fiber content of these same hays; (3) lignin and cellulose content of these hays and study relation between these values and digestible energy values; and (4) apparent digestibility of crude fiber fraction of hays.
Agr. Chem., Anim. Indus., Agron. 114 (NE-24)

Md. Nutritive Evaluation of Forages. To (1) determine nutritive value of forages fed to dairy cattle as affected by stage of maturity at harvesting, fertilizing and management practices, (2) evaluate different methods of harvesting and preserving forages, (3) determine total yield of nutrient material per unit of land from forages subjected to the above management procedures, and (4) aid in development of improved chemical techniques for evaluation of forages.
Dairy Husb., Agron. G-47 (NE-24)

Mass. Quality in Roughage: I. A Study of the Factors Which Influence Composition, Palatability, and Value for Milk Production of Roughages (Hay and Silage) Grown in Northeastern United States. II. The Nutritive Evaluation of Forage by Means of Production Trials and Laboratory Tests. (1) Learn value for milk production of forages grown in region, with emphasis on crops of relatively recent introduction in comparison with those indigenous. (2) Learn effect on nutritive value of forage crops (of recently introduced crops and indigenous species) of increased use of fertilizers and improved methods of harvesting and storing. (3) Correlate results of milk production trials of crops with chemical analyses and other indicators of forage quality in search for simple test, as criterion, for quickly judging nutritive value of forage.
Anim. Husb., Agron., Chem., Dairy Husb., Anim. Sci. 37 (NE-24) Coop. USDA

Mich. The Chemical Determination of the Carbohydrate Fraction in Various Forage Crops and their Isolation and Identification. (1) Investigate suitability of existing chemical methods for learning various carbohydrates in forage crops and devise new methods whenever necessary, (2) make systematic chemical study of carbohydrates in forage crops consumed by ruminants, (3) investigate environmental conditions influencing composition of forages, (4) make digestion trials on forages when feasible.
Agr. Chem., Dairy Indus., Pl. Physiol. 811 (NC-25)

Mich. Microbiological and Biochemical Studies of the Fermentation of Forage-Crop Silages. (1) Study microorganisms of the silage process, including biochemical changes, (2) use findings to develop ways to produce silage of good quality, especially with high protein, high moisture silages.
Microbiol. 828

Minn. The Production, Preservation and Storage of Grass Silage. (1) Learn to what extent various factors influence fermentation, and value of silages and methods of quality evaluation. (2) Study dry matter and nutrient losses in harvesting and storage of forages used for silage; (3) nutrient intake, palatability and costs, of various silages when fed to different classes of livestock.
Agron., Pl. Genet. 1324

Minn. Investigation of the Carbohydrates of Forage Crops with Special Emphasis on the Hemicelluloses. To investigate chemical nature and structure of carbohydrates of forage with emphasis as above. To accomplish by: (1) isolating hemicelluloses from bromegrass and from alfalfa, (2) degrading hemicelluloses or derivatives prepared therefrom into components as pentoses and uronic acids and their derivatives; separate and identify latter by chemical and physical properties; determine quantitatively relative proportions of various components of hemicellulose molecules. (3) Deduction from objective 2 manner in which components are linked together, thus providing basis for studies of susceptibility of various linkages to cleavage by enzymes of rumen microorganisms. (4) Providing specimens of isolated hemicelluloses to investigators in Regional Cooperative Project who may wish to study digestion and fermentation in "artificial rumen". (5) Investigating other carbohydrate components as fructosans and oligosaccharides that may be isolated incidental to procedures used for isolation of hemicelluloses.
Biochem., Dairy Indus., Anim. Indus. 1518 (NC-25)

Miss. A Study to Determine the Value of Supplements for Improving the Utilization of Low-Quality Roughages. Learn kind of supplementation needed for maximum utilization of low-quality roughages by wintering beef cattle.
Anim. Husb. HE-10

Miss. The Effect of Different Cultural and Curing Methods on the Feeding Value of Mississippi Hay Crops. (1) Learn feeding value of hay made from various crops adapted to state soil and climate. (2) Study effect of heavy fertilization on palatability, digestibility, and optimum stage of growth for hay making of these different crops.
Dairy, Agron. HG-19

Mo. Forage Harvesting, Handling, Storage and Feeding -- c. Harvesting, Processing and Feeding Forage as Hay. To study (1) methods of storing and feeding hay in the field; and (2) methods of curing baled hay by ventilating with unheated air.
Agr. Engin., Anim. Husb. 138-c

Mo. Forage Poisoning Caused by Drought. To (1) develop a quick chemical test to predict if forage would be toxic to farm animals, (2) learn if the toxicity of forage declines after ensiling, and (3) study physiological effects of high nitrate intake on farm animals and investigate ways of counteracting the effects.
Chem. 247

Mo. Changes in the Physical Structure of Roughages During Growth and Digestion. To note changes in physical structure, as indicated by X-ray diffraction and electron microscopy, of wheat and lespedeza during their growth and digestion by rumen microorganisms.
Anim. Husb. 250 (NC-25)

Nev. High Roughage Feed for Dairy Stock. To learn effect of feeding high roughage diets to milking cows, dry cows, heifers, and calves.
Anim. Husb., Ext. 20

Nev. Isolation and Determination of Bloat Producing Saponins in Nevada Forage. (1) Secure composite samples of saponins sapogenins from Western Utilization Research Branch and separate or isolate saponins and sapogenins. (2) Develop a better strain for identification by chromatography or electrophoresis. (3) Quantitatively learn saponins or sapogenins present.
Agr. Chem. 37. Coop. ARS

Nev. Chemical Studies of Nevada Range Plants, Forage Crops and Livestock Water Supplies. To (1) determine chemically the comparative feeding value of Nevada range plants and forage crops when grown, harvested, and stored under various conditions, and particularly in conjunction with other Station projects on nutrition of range and farm animals, and (2) determine occurrence or lack of vitamins and trace and other chemical elements in hays, forages, and waters and the relations of these, their deficiencies and excesses, to reproduction, growth, and survival of Neveda livestock.
Chem. 59

N. H. The Hemicellulose of Forage Crops. To determine what difference occur in the hemicelluloses of forage crops (1) in different parts of the plant, and (2) as the plant matures.
Agr. and Biochem. 47. Coop. ARS

N. H. Analysis of Forage Samples. To determine amounts of certain organic constituents in samples of grasses, silages, and hays, and the changes they undergo during preservation and storage.
Agr. and Biochem. 77 (NE-1)

N. H. The Nutritive Evaluation of Forage for Dairy Cattle. (1) Improve and standardize procedures for nutritive evaluation of forages for dairy cattle. (2) Compare values for energy as net, digestible, and metabolizable, and compare digestible dry matter and total digestible nutrients determined on same forage. (3) Learn effect of stage of maturity and level of N fertilization on nutritive value of certain forages. (4) Learn effect of variables on nutritive value of acre yield. (5) Learn effect of variables on excretion of certain B complex vitamins.
Dairy Sci., Agr. and Biochem. 102 (NE-24)

N. J. Nutritional Studies on the Growth and Development of Dairy Cattle, Determination of the Digestibility of Grass Hays Grown with Various Levels of Nitrogen Fertilization. To learn (1) digestible energy and digestibility of various nutrients of grass hays grown under various levels of N fertilization; (2) N balance on dairy heifers fed grass hays grown under various levels of N fertilization; (3) digestible energy and digestibility of various nutrients of high protein grass hays relative to that of lower protein grass hays where N content of latter is made equal to the former by urea supplements. (4) Thru use of artificial rumen and similar "in vitro" techniques, study utilization of nutritionally important components of hays as listed above.
Dairy Indus., Anim. Husb. 148

N. J.

Relationship of Time of Cutting to Digestibility of Hay From Alfalfa and Birdsfoot Trefoil. To determine the digestibility of (1) alfalfa hay cut during the 1/10, 1/2, and full bloom stages; and (2) birdsfoot trefoil hay during the 1/10, 1/2, and full bloom stages.

Anim. Husb., Farm Crops 90 (NE-24)

N. Y.
(Cornell)

The Relationship of Time of Cutting to the Digestibility of Different Forages. Learn (1) digestibility of energy and dry matter of first cuttings of orchard grass, bromegrass, timothy, and alfalfa. Empire birdsfoot trefoil, red clover, Viking birdsfoot trefoil, and ladino clover cut: May 20, June 7, June 25, and July 7, (2) digestibility of aftermath growth when cut at various intervals, (3) influence of irrigation on digestibility of forage, (4) effect of N fertilizer on digestibility of grasses, (5) relationship of leaf and moisture content to digestibility.

Anim. Husb., Agron. 66 (NE-24)

N. Y.
(Cornell)

Influence of Date of Cutting, Nitrogen Fertilization, and Irrigation upon the Yield and Digestibility and Intake of Different Forages by Ruminants. To learn (1) digestibility and intake of first cutting of orchard grass, bromegrass, Climax and commercial timothy, Narragansett and DuPuits alfalfa, Empire birdsfoot trefoil, Viking birdsfoot trefoil, red clover and ladino clover cut at four different dates representing four stages of maturity; (2) digestibility and intake of aftermath growth when cut at various intervals; (3) effect of N fertilizer on digestibility and intake of grasses; (4) influence of irrigation on digestibility and intake of forages. (5) Study relationship of leaf content to digestibility.

Agron. 186

N. Y.
(Cornell)

Maximum Utilization of Forages by Livestock. To study (1) effects of methods of harvesting and storing on nutrient losses and chemical composition of forages; (2) effects of time of cutting on chemical composition and digestibility of forages for various classes of livestock; (3) by comparing the quality and feeding value of forages cut at different stages of growth and handled by different methods for feeding various classes of livestock, especially dairy and beef animals; (4) value of pastures with and without supplemental feed at various times during grazing season; (5) effects of high quality forage in reducing need for concentrates.

Anim. Husb. 195 (NE-24)

N. C. Biochemical Factors that Affect the Apparent Nutritional Qualities of Forages. (1) Identify and biologically characterize organic compounds in forages having a physiological action. (2) Identify factors in forages causing differences in animal responses associated with digestibility of feed consumed.
Anim. Indus. 35

N. Dak. The Development of Improved Methods of Forage Crop Evaluation. To study (1) relationship between nutritive value of forages expressed as T. D. N. produced an acre as determined by forage yield and associated chemical analyses, and by measurable products from animals grazing the same forages; and (2) study use of chromogen and chromic oxide techniques of determining intake and digestibility of forages by grazing animals.
Agron., Anim. Husb. 6-12 (NC-11)

Ohio Comparison of Silage and Soilage for Summer Feeding of Dairy Cows. Learn (1) response in milk production to feeding of meadow crop silage vs. field chopped meadow crop, (2) over-all advantages and disadvantages of both systems, (3) costs of producing and feeding grass silage to cows in stable compared with feeding field chopped meadow crop.
Dairy Sci., Agron. 34-1

Ohio The Effect of Length of Harvest Period and Rest Period on Yield and Survival of Forage Plants. Learn (1) effect of length of harvest period and rest period and interactions of two on yield of forage, and (2) effect of the two on survival of forage; (3) interactions of harvest period and rest period with soil moisture levels.
Agron. 34-8

Ohio Microbiological Investigations of Silages. To (1) study silage preservatives from viewpoint of their effect on silage microflora, especially fungi; and (2) examine silage microorganisms for antibiotic production.
Bot. 41-5

Ohio Chemical Analysis of Crops and Silage. To (1) determine chemical composition of crops as ensiled and of silages made in main project or in individual sub-projects; (2) relate changes in composition to various procedures or treatments given individual lots of silage; (3) relate chemical composition to human scoring and palatability to animals; and (4) develop new methods of improving existing methods of silage analysis.
Dairy Sci. 41-7

Ohio Feeding Trials with Meadow Crop Silage. To obtain a high quality meadow crop silage and to compare such silage with corn silage in feeding trials with milking cows.
Dairy Sci. 41-10

Oreg. The Nutritive Evaluation of Pasture Grasses by Use of Plant Chromogens. To determine the adaptability of the chromogen method for showing significant differences in digestibility between genotypes of tall fescue.
Agr. Chem., Farm Crops 80-4 (W-40)

Pa. Methods of Preservation and the Measurement of Nutritive Values of Forage Crops. -- A. The Nutritive Value of Grass Silage as Affected by Species and Stage of Maturity. To establish quantitatively the relationship of nutritive value of silage to definite species of forages and to stage of maturity of forages when harvested.
Agron., Anim. Nutr. 1016-A

Pa. Methods of Preservation and the Measurement of the Nutritive Values of Forage Crops. -- D. Fermentation Studies in Grass Silage. To observe changes in grass silage made with various additives in relation to numbers and types of bacteria present, substrate on which they are working, and products of fermentation, various organic acids, mainly propionic, lactic, acetin and butyric acid.
Anim. Nutr., Bact. 1016-D

Pa. Methods of Preservation and the Measurement of the Nutritive Values of Forage Crops. -- E. The Nutritive Value of Hay as Affected by the Method of Curing. To determine (1) if it is feasible to bale hay at moisture higher than 20%, which is safe for good keeping in storage, by adding a preservative agent at time of baling or storage; (2) best method to apply sodium bisulfite at baling to insure uniform distribution thru the bale; and (3) by nutritive evaluations if addition of sodium bisulfite results in enough saving of feed nutrients present in forage to justify additional cost and application.
Anim. Nutr., Engin. 1016-E

Pa. Utilization of Forage by Beef Cattle. To (1) evaluate methods of utilizing high quality pasture and harvested forage in feeding beef cattle, (2) measure relative cost of beef production under feeding systems in which concentrates are replaced with pasture and harvested forage, and (3) evaluate relative quality of beef produced under various feeding systems used.
Agron., Anim. Husb. 1245

Pa. *The Nutritive Evaluation of Forages*. To learn (1 and 2) digestible dry matter, digestible protein, and digestible energy of forages of particular value in Northeast, using sheep as experimental subjects; (2) above constituents on forages produced by New Hampshire station for special cooperative studies. Metabolizable energy to be learned on three of forages. (3) Compare nutrient values of forages as measured by sheep with those measured by cattle, rabbits, chemical analysis, etc.
Anim. Nutr. 1263 (NE-24)

P. R. *The Utilization of Grasses, Legumes and Other Forage Crops for Cattle Feeding in Puerto Rico*. To determine (1) best grasses. legumes and other forage crops to grow for cattle feeding; (2) best feeding methods; and (3) possibilities of preparing hay and silage under Puerto Rican conditions.
Anim. Husb. 43

R. I. *Nutritive Evaluation of Forages*. Learn nutritive value of forages fed to dairy heifers as affected by stage of maturity, learn nutrient yield of forages fed per unit of land, study effect of plant maturity on cellulose and lignin content.
Agron., Anim. Husb., Dairy Husb., Chem. 304 (NE-24)

S. Dak. *The In Vitro and In Vivo Digestibility of Prairie Hay and Other Forages as Related to the Carbohydrate Components*. (1) Study the *in vitro* digestibility of prairie hay and local forages with emphasis on carbohydrate fractions. (2) Conduct digestion trials in conjunction with *in vitro* studies in order to correlate differences of carbohydrate fraction content with nutritive value of forages.
Anim. Husb. 293 (NC-25)

Tenn. *The Evaluation of Different Pasture Species in Various Combinations and at Varying Rates of Nitrogen Fertilization as Reflected in Beef Cattle Gains and Forage Yields*. Evaluate different pasture species alone and in combination and at varying rates of N fertilization as reflected in beef cattle gains and forage yields.
Agron., Anim. Husb. 52

Tenn. *Evaluation of Roughages for Beef Cattle*. Evaluate roughages common to Tennessee farms as grain silages, grass silages, hays, cottonseed hulls, etc., for beef production.
Anim. Husb., Vet. Sci. 72

Tenn. *Evaluation of Forages for Dairy Cattle*. Learn (1) relative feeding value of various forage species for growth and milk production; (2) most desirable method of feeding forages.
Dairying 161. Coop. ARS

Va. Evaluation of Available Techniques and the Development of New Techniques for Measuring Forage Utilization with Livestock. To determine (1) reliability of chromium oxide and plant chromogens as indicators to measure dry matter intake and use by dairy and beef animals; (2) use of inert chemical compounds as indicators in digestibility studies to simplify analytical procedures; and (3) dry matter intake and digestibility of various plant species grown for pasture and cured forages for production of milk, beef, wool and lambs.

Biochem. and Nutr., Dairy Sci., Anim. Husb. 86030 (S-12)

Va. The Evaluation of Forages with Dairy Cattle. To learn how state of growth or time of cutting affects quality and/or feeding value of pasture, silage, hay and soiling. Following will be included: intake, palatability, and digestibility effects; balance of nutrient intake; effect on certain blood constituents (carotene, hemoglobin, non-protein N), milk production, body-weight changes, and growth rate; effect of rumination rate, respiration rate, heart rate, and body temperature.

Dairy, Biochem., Agron. 86077

Wash. The Determination of Lignin in Forages. To develop a rapid and economical method of lignin determination which may be used as a measure of the digestibility of forages.

Agr. Chem. 1231

Wis. A Study of Methods and Equipment for Preserving Forage Crops for Livestock. (1) Study potentialities for field pelleting of forage crops. (2) Improve the quality and prevent excessive losses in grass silage. (3) Learn effects of cutting oats at various growth stages on yield and quality of silage made from harvests, and on associated forage seedings.

Agron., Dairy Husb., Agr. Engin. 522

Wyo. Testing Grasses and Legumes for Forage Production and Palatability. To test (1) varieties and strains of alfalfa and grass for forage production and other desirable characteristics, (2) certain grasses for relative palatability and to learn if applications of N to soil will affect palatability, (3) effect of geographic strains and certain soil conditions on palatability of a single grass species.

Agron. 585

V. FORAGE AND RANGE ESTABLISHMENT

Colo. Improving Sagebrush Lands to Obtain Maximum Range Livestock Production. -- A. Artificial Reseeding Phase. To (1) determine most satisfactory seedbed preparation methods, seeding, and forage plants and mixtures adapted for reseeding, and (2) evaluate improvement in terms of increased meat production in comparison with unimproved range.
Forage and Range Mgt. 65a

Colo. Induced Revegetation of Range and Croplands to Increase Meat and Wool. To ascertain (1) adaptation of native and exotic dryland forage plants (grasses, legumes, forbs, and browse); (2) economically feasible cultural practices for establishing stands for pasture, protective cover, or seed production; (3) economically feasible methods of converting surplus grainlands to pasture; (4) need for and influence of fertilizers in improving stands and increasing production of forage and/or seed; (5) need for and influence of inoculants and fungicides in increasing forage stand and production; (6) methods of renovating and converting low producing native range to higher producing pastures; and (7) utility of adapted forage plants and mixtures for grazing, erosion control, landscaping and military purposes, and seed production.
Forage and Range Mgt. 66

Storrs (Conn.) The Effects of Various Pre- and Post-Seeding Practices on the Establishment of Legume-Grass Mixtures. To determine how establishments of legume-grass seed mixtures are affected by: presence of, and time of harvesting a companion crop; clipping treatments; and kinds, rates, and placements of fertilizers.
Pl. Sci. 219 (NE-29) Coop. USDA

Fla. The Maintenance of Soil Fertility Under Permanent Pasture. To study (1) effects of different soil types and various management practices on yields, composition of forage and animal response; and (2) effect of these practices on physical and chemical characteristics of soil and on maintenance of soil fertility.
Soils 404

Ga. Factors Affecting The Germination of Cotton and Winter Legume Seed. Studies will be made to find the optimum conditions for the germination of seeds both under field and laboratory conditions and to determine the effects of various conditions, such as fertilizers, soil preparation, diseases, moisture, temperature, and varieties, both singly and in combination, upon the germination of seed and growth of seedlings. The value of different materials used in treating seed and the effect of such treatment on inoculated legume seed will be determined.

Agron. 25

Ill. The Effect of Tillage, Planting Method, and Placement of Fertilizer on the Production and Maintenance of Forage Crops. To (1) determine effect of deep tillage and placement of fertilizer on grain and forage yields and maintenance of stand composition; (2) determine effects of various methods of seedbed preparation on grain and forage yields and stand composition; (3) study root development under above treatments; and (4) study effect of deep tillage and methods of seedbed preparation on water storage capacity of soil, availability of soil moisture, and on soil and water losses.

Dixon Springs 40-326

Ky. Establishment and Maintenance of Pasture Mixtures. To determine (1) seeding practices by which simple mixtures of grasses and legumes adapted to Kentucky can be established in desired proportions for pasture, and (2) management practices that will maintain established mixtures in desired proportions.

Agron. 168

Md. Seedling Establishment and Management of Legumes and Grasses. To (1) determine effect of various clipping treatments on seedling establishment and later of forage species, grown with and without a companion crop; (2) determine effect of fertilizer levels, fertilizer placements, and seed placements of seedling establishment, and later development of forage species; and (3) relate varying effects of management practices and climatic influences, in order to determine best combinations of procedure for successful establishment of forage species.

Agron. B-56-m (NE-29)

Minn. Forage Crop Production and Management. -- 1. Methods of Obtaining Stands. To determine the best techniques in establishment and management of grasses and legumes for pastures and hay.
Agron., Pl. Genet., Soils, Anim. & Dairy Husb. 1302-1. Coop. SCS

Minn. Forage Crops Production and Management. -- 3. Rotation and Supplementary Pastures. To determine best techniques for establishment and management of grasses and legumes for pasture and hay.
Agron., Pl. Genet., Soils, Anim. & Dairy Husb. 1302-3. Coop. SCS

Miss. Evaluation of the Practice of Sod Seeding with Respect to Crops, Sods, Dates of Seeding, Drill Spacings, Rates of Seeding, and Rates of Fertilization. To evaluate practice and principle of sod seeding with emphasis on following: 1. Influence of spacing, seeding, and fertilizer rates on yield of small grain and subsequently on performance of pasture. 2. Date and method of seeding winter annuals in summer sod. 3. Relative performance of various crops, combinations of crops, and host sods.
Agron. HC-6

Nebr. Miscellaneous Legume Problems. To learn (1) if seed inoculation is needed in areas where a legume is to be grown for first time, (2) influence of chemical treatment of legume seed either prior to or following inoculation with proper rhizobia strain, on root nodule development, yield of vegetative material and production of crude protein, (3) if failure of some leguminous species to nodulate is due to nodulation being inherently delayed in life cycle, (4) if nodulation can be accomplished by applying inoculant to other materials that would be placed close to seed in form of a band at planting, (5) influence of seed scarification on inoculation and nodulation, (6) if hull on seed of Korean lespedeza contains a substance which inhibits germination and nodulation.
Agron. 517. Coop. ARS

Nev. Factors Affecting Establishment of Forage Crops on Irrigated Lands in Nevada. To (1) study effects of season of planting, seedbed preparation, irrigation interval, and their interaction on establishment of irrigated forage plants on saline soil that has a high water table, (2) evaluate methods of seeding on forage plant establishment, (3) investigate effects of water table and competition and other factors on establishment of forage plants.
Agron., Range Mgt. 45

Nev. Field Germination of Forage Crop Seeds. To determine germination requirements for pasture and range seeds now planted in northern Nevada or anticipated for possible future planting.
Farm Devlpmt. 84

N. J. Seedling Establishment and Early Development of Forage Legumes and Grasses as Affected by Seeding Practices, Fertilization, Clipping Treatments and Climatic Variation. To (1) determine effect of various clipping treatments on seedling establishment and later development of forage species, grown with and without companion crops; (2) determine effect of various fertilizer levels and fertilizer placements on seedling establishment and later development of forage species; (3) determine effects of variations in microclimate on seedling development and survival; and (4) use observed data in developing methods for more successful establishment of hay and pasture seedings on farms of New Jersey.
Farm Crops 255 (NE-29) Coop. ARS

N. Y. (Cornell) Meadow and Pasture Seeding Mixtures, Principles of Compounding, Factors Influencing Successful Establishment and Subsequent Seedling Management. -- 1. Meadow and Pasture Seeds Mixtures and Seedling Management. To (1) develop hay and pasture seeding mixtures which will produce maximum yield of nutritious herbage thru season and over a period of years; investigating principles underlying successful compounding of seeds mixtures of species, types, varieties, and strains of grasses and legumes; and (2) investigate and develop systems of species and mixture management so as to obtain maximum benefit in form of economical production of quality herbage.
Agron. 52-1 (NE-29)

N. Y. (Cornell) Meadow and Pasture Seeds Mixtures, Seeding Management, and and Factors Affecting Successful Establishment of Forage Grasses and Legumes. -- 2. Factors Affecting Successful Establishment of Forage Grasses and Legumes. To (1) investigate and develop methods of improving seeding establishment of hay and pasture crops in New York; (2) develop improved seeding techniques and cultural practices; and (3) investigate and determine cause of current widespread seeding failures which result in great annual losses.
Agron. 52-2 (NE-29)

Pa. Seeding and Establishment of Grasslands. To determine effect of various seeding practices on establishment of grasses alone or in mixture with attention to: 1. spring cultural treatments preceding seeding on fall sown small grain; 2. various seeding methods; 3. dates of seeding; and 4. methods of handling companion crop.
Agron. 1206 (NE-29)

Utah — Methods of Seeding Sagebrush and Juniper Ranges and Effects of Various Grazing Treatments Upon Resulting Stands. Study effects of season of seeding, intensity of seeding, and drill row spacing on seedling establishment and subsequent forage production on foothill and abandoned dry farm land. Measure productivity of various methods of brush eradication and planting as correlated with costs and returns. Learn competitive effects of summer annuals on survival of newly seeded wheatgrasses. Study economics of large scale seeding by Bureau of Land Management thru Utah by collecting data dealing with method of soil preparation and seeding failures and varying degrees of success, grazing management, and increased forage production.

Range Mgt. 360. Coop. USDI

Vt. — Determination of Major Factors Affecting Establishment, Maintenance, and Productivity of Perennial Forage Species in the Northeast. Phase 1, Seeding Establishment: To determine (1) effect of various management practices on establishment and early development of forage grasses and legumes when seeded with and without a companion crop of oats; and (2) relationship between varying influences of species, seedling management and climatic influence upon seedling establishment; Phase 2, Strain and Variety Evaluation: To (1) determine establishment, persistence, and productivity of regionally developed strains of birdsfoot trefoil; (2) relate above performance data to observable morphological and physiological characteristics of the strain; (3) compare performance and characteristics of strains among themselves and in relation to standard check varieties; and (4) use observed data in determining methods for the intelligent formulation of regionally adapted synthetic varieties and in establishing selection criteria for more efficient plant breeding activities.

Agron. 26 (NE-29)

Wyo. — Field Germination and Grass Seedling Establishment on Range Land. To study (1) significant factors of habitat which affect germination of the grass caryopsis and preservation of sprouts of perennial grasses; and (2) how to manipulate these factors in order to favor establishment of range grasses in brush covered areas.

Agron. 544 (W-25)

VI PASTURE AND RANGE ECOLOGY

Ariz. The Range Resources of Arizona. To (1) develop an analysis of range condition classes on each major forage type of principal grazing counties; (2) develop an analysis of upward and downward range condition trends in principal grazing counties; (3) assemble information on grazing value of each of more common plants mentioned; and (4) present range management techniques for each condition class in each of major forage types.
Range, Agron. 232. Coop. SCS

Ariz. Shrub Invasion-Forage Production Inter-Relations on Arizona Rangelands. Learn site characteristics affecting potential shrub invasion and forage production.
Agron., Range Mgt. 292. Coop. FS

Ariz. Changes in the Desert Grassland -- An Analysis of Causes. To determine changes in plant cover and in factors affecting plant cover that have taken place in the Southwestern grasslands since white settlement.
Bot., Range Ecol. 365 (W-25). Coop. FS, SCS

Calif. Ecological Balance in Range Species as Influenced by Manipulation of Environmental Factors Including Fertilization, Seeding Adapted Species, and Livestock Use. To learn (1) evaluation of forage production and livestock gains on range seeded with perennial and annual species and unseeded range, (2) effect of livestock manipulation on maintenance of stands, (3) characterization of range microclimate.
Agron. 1654. Coop. ARS, FS

Idaho Development of a Fundamental Vegetation-Soils Classification of Non-Forested Ranges in Idaho as a Basis for Range Improvement. To (1) make basic study of vegetation and soils of non-forested range areas, to recognize and analyze different habitat-types of each major kind of range; (2) determine successional changes produced in vegetation and soils on habitat-types by separate or combined effects of heavy grazing, fire, insects, erosion, or other disturbing factors; and (3) evaluate potential productivity of various range habitat-types and thus provide sound basis for management and improvement practices adapted to specific range areas.
Agron., Agr. Chem. 287 (W-25). Coop. ARS

Kans. Ecological Studies of Grasslands and Other Areas. To study some aspects of community dynamics, with special emphasis on the soil moisture relationships.
Bot. 435

Mo. Ecological Studies in Forestry. -- d. Effects of Forest Grazing. To make annual re-measurements of original 20 grazed and ungrazed plots at Weldon Spring in Stands 23 and 19.
For. 123-d

Mont. Development of Improved Grass and Legume Mixtures for Irrigated Pastures in the Northern Great Plains. To develop and evaluate grass and legume mixtures for irrigated areas of Northern Great Plains that are superior in production, longevity of grazing season, palatability, disease resistance, and adaptability to environmental conditions of this region.
Agron. 150

Nebr. Factors Affecting the Classification of Range Sites in Nebraska Sandhills. (1) Classify range sites of sandhills on basis of edaphic and vegetative characteristics. (2) Learn edaphic factors that are associated most closely with distribution of grasses within sandhills.
Agron. 587. Coop. SCS

Nev. Ecology and Management of Whitesage, Eurotia lanata. To (1) discover conditions contributing to success of both natural and artificial reseeding of whitesage on range; (2) determine optimum season and intensity of utilization of whitesage; (3) learn role and importance of insects in injury of whitesage stands, and feasibility of using known control measures or of developing new ones; (4) learn more regarding management of whitesage where invasion by undesirable species is a problem; (5) ascertain feasibility of water spreading as a means of stimulating forage production of whitesage; and (6) incorporate all old and new information, by interpretation, into a set of recommendations for better management of whitesage.
Agron., Range Mgt. 3. Coop. ARS, USDI

Nev. The Ecology and Management of Indian Ricegrass, or Oryzopsis hymenoides. To learn enough of the ecology of Indian Ricegrass to make reliable recommendations on practices for establishment of new stands, and improvement of existing stands.
Agron., Range Mgt. 4. Coop. USDI, ARS, FS

N. Mex. Ecology of Creosote Bush (Larrea divaricata) on Desert Grassland Range. To determine (1) influence of good and poor cover of perennial grasses on establishment of creosote bush; (2) influence of grazing by domestic livestock and range rodents, and competition by creosote bush on restoration of desirable forage grasses to deteriorated range; and (3) certain autecological and life history characteristics of creosote bush.

Anim. Husb. 51 (W-25)

N. Mex. Effect of Season and Location on the Chemical Composition of Range Forage. (1) Periodically sample chemical composition and seasonal variation for important range plants in 10 representative areas of State. (2) Learn loss or variation of different nutrients that may be caused by wintering, leaching, or other factors. (3) Measure available P of soil and its relation to plant P. (4) Learn trace mineral content of most important range grasses in New Mexico.

Anim. Husb. 52 (W-34)

N. C. Ecological Relationships of Permanent Pasture Plants. To (1) determine relative values and adaptations of promising grasses and legumes when grown in associations; (2) determine associative effects of various mixtures on the botanical and chemical composition of the individual species; (3) determine effects of various management systems on the survival, productivity, and chemical composition of certain adapted pasture legumes and grasses; (4) study root interrelationships of certain adapted pasture legumes and grasses; (5) study moisture requirements of certain adapted pasture legumes and grasses; and (6) determine best method of establishment of permanent pasture mixtures including proper seeding rates, methods, and inoculation procedures.

Field Crops 64

N. Dak. Botanical Composition and Forage Production of Native Grass Grazing Lands in Western North Dakota. Learn forage production and vegetative composition of native grass range types in Western North Dakota in relation to their range condition status.

Bot. 9-2. Coop. SCS, FS, ARS

N. Dak. Native Range Plants - Their Growth and Development in Relation to the Establishment of Standards for Their Proper Utilization. To (1) study growth and development of important native range plants, (2) evaluate ability of range plants to survive and to produce forage under varying degrees of defoliation, (3) select methods of determining range use that can be applied to western North Dakota native grass ranges, and (4) establish standards for proper use of important range forage plants of western North Dakota.

Bot. 9-5

Oreg. Improvement and Management of Oregon Pastures and Ranges. 1. Development of a Fundamental Vegetation-Soils Classification of Non-Forested Ranges in Oregon as a Basis for Range Improvement and Management. To (1) learn vegetation-soils relations which characterize habitat types of non-forested ranges of Oregon where sagebrush and/or rabbitbrush create forage production problems; (2) establish suitable vegetation-soil guides to habitat types for application in range improvement, management, and other research programs; and (3) learn patterns of change in vegetation and soils as aid in identifying habitat type of disturbed areas

Anim. Husb., Farm Crops, Bot., Soils, Econ., Pl. Path. 160-1 (W-25). Coop. SCS

Oreg. Improvement and Management of Oregon Pastures and Ranges: An Evaluation of Rodent Damage and the Need for Control Measures on Oregon Sagebrush Ranges. To learn (1) influence of rodents and other small mammals on plant succession of selected habitat types on eastern Oregon sagebrush ranges; (2) various species and numbers of rodents and other small mammals including rabbits present. (3) Study habits and movements of these and add information to their life histories. (4) Learn need for rodent control measures in improving sagebrush ranges.

Fish and Game Mgt. 160-11. Coop. USDI, ARS

Utah Plant and Soil Relationships Determining Changes in Plant Cover on Desert Shrub Range Lands. To determine (1) why range plants occur in specific local areas and role of soil, water, salt, soil solution and livestock in plant distribution and invasion; (2) effect of soil on nutrient content of forage plants; (3) effect of forage removal on physiological response of desert browse and grass species under various degrees of use during various periods of grazing season; and (4) effect of forage removal on nutritive content of desert browse and grass plants when used at various degrees and at various periods during grazing season.

Range Mgt. 411 (W-25). Coop. USDI

Utah *The Influence of Small Mammals upon Range Forage Production and Availability*. (1) Learn extent of competition for range forage between rabbits and rodents, and livestock. (2) Evaluate forage consumption of small mammals and resultant effect on range conditions. (3) Learn influence of small mammals on natural plant succession.
Range Mgt. 473

Wash. *Development of a Fundamental Vegetation-Soils Classification for Arid Portions of Washington as a Basis for Range Improvement*. To determine (1) habitat types comprising major subdivisions of arid rangelands of central Washington where sagebrush and/or rabbitbrush create problems in forage production; (2) suitable vegetation-soil guides for identifying these habitat types for use in range improvement and research; and (3) plant successions upon each habitat type so that areas of comparable productivity can be recognized regardless of variations in types of plant cover now occupying them.
Agron. 1224 (W-25)

Wash. *Important Range Problems of Eastern Washington*. (1) Discover the important range problems of eastern Washington. (2) Assign priorities to these problems as a means of giving direction to Washington Experiment Station Range Research Program.
For. 1340

Wyo. *Development of Vegetation Condition Classes for Wyoming Range Types*. To (1) apply vegetation condition class survey to range types not already covered; (2) correlate these class studies with water infiltration studies; (3) correlate class studies with forage yield studies; and (4) study ecological succession and climax related to condition class surveys.
Agron. 514 (W-25)

VII. PASTURE AND RANGE MANAGEMENT

Ark. Grazing Management Trials in Arkansas. To conduct grazing trials on (1) different permanent pasture species and species mixtures under different cultural practices, as irrigation and fertilization, and (2) winter supplemental pastures.
Agron. 472

Calif. Brush Seedling Establishment and Growth in Relation to Soil Fertility Levels. To determine (1) if brush increase is related to soil fertility level, and (2) to what extent brush can be controlled by increasing soil fertility thru fertilization.
For., Agron., Soils 1570 (W-25). Coop. SCS

Colo. The Effect of Fertilizers on the Seasonal Trends in Nutrients of Native and Reseeded Forage Plants in Relation to Range Livestock Production. To determine effect of N fertilization on production and nutrient content of native range and reseeded pastures.
For., Range Mgt. 62

Colo. Improving Sagebrush Lands to Obtain Maximum Range Livestock Production. A. Artificial reseeding phase. B. Eradication phase. C. Improvement by better grazing systems.
For., Range Mgt. 65

Colo. Improving Sagebrush Lands to Obtain Maximum Range Livestock Production. -- B. Eradication Phase. To determine most practical and economical methods to improve sagebrush rangelands of low productivity by using the following better range management practices singly or in combinations: a. use of scientific grazing systems and other improved livestock management practices, b. eradication of sagebrush, and c. artificial reseeding of both abandoned croplands and treated sagebrush lands to adapted forage plants.
For. and Range Mgt. 65b

Colo. Improvement of High Altitude Irrigated Meadows. To determine (1) optimum moisture-plant relations for high yield of good quality hay and pasture at elevations over 7,000 feet; (2) best fertilizer types and combinations and most effective rates and methods of application of meadow plant species in these meadow areas; (3) most suitable species, strains and mixtures of plants for hay meadows and irrigated pastures at high altitudes; (4) better methods to establish stands of desirable species in old meadows or on new lands; (5) best time of harvest and best management practices to give high yield and quality of hay and forage on mountain meadows; and (6) nutrient value and productive value of hay and forage produced in these experiments.
Agron., Anim. Husb., Range Mgt. 147. Coop. ARS

Colo. Forage Production and Species Composition of Sagebrush Ranges as Affected by Climate, Soil Moisture, and Intensity of Grazing. To learn (1) effect of two intensities of grazing on soil moisture conditions of sagebrush ranges; (2) relations between total precipitation, air temperature, wind velocity, and soil moisture under two intensities of grazing; (3) changes in plant cover related to soil moisture and grazing intensity; (4) trends in forage production related to soil moisture, grazing intensity, and changes in plant cover; and (5) weight gains of livestock under two intensities of grazing on sagebrush ranges.
For. 221 (W-25)

Fla. Pasture Grass and Legume Responses to Various Fertilizer and Management Practices. To evaluate rate, ratio, method and and time of application of major and minor nutrients to grasses, legumes, and grass-legume combinations as measured by herbage yield, cattle gains, and chemical and botanical composition.
Agron. 295

Fla. Herbage Composition and Animal Response as Influenced by Pasture Management. To evaluate nutritional qualities of herbage grown under specified conditions in terms of animal responses and of the composition of the herbage.
Anim. Husb., Nutr. 356

Ga. The Value of Various Forage Crops and Effect of Management Practices on Pasture Production in Central and North Georgia. To determine (1) desirable practices for grass and legume establishment; (2) adaptability, forage production, and proper management for use and maintenance of pasture plants and their chemical composition; (3) better adapted species and further study their specific value for forage and pasture; (4) practices for economical and efficient pasture renovation; and (5) a pasture system to provide year-round grazing.
Agron., For., Chem. 37

Ga. Fertilizer Requirements of Pasture Plants Grown on the Piedmont Soils of Georgia. Learn: (1) effect of rates and combinations of N, phosphate, potash, secondary and minor elements on forage and seed production and chemical composition of various pasture plants and combinations of plants grown on Piedmont soils; (2) compatability of various grasses and legumes and the change in botanical composition of pasture swards under different fertilizer treatments.
Agron., Chem. 40

Hawaii *Methods in, and Evaluation of, Range Improvement Practices in the Humid Lowland Pastures of Hawaii*. To define and measure appropriate practices of brush control, renovation of sward, fertilization and reseeding in pastures of Hawaii in terms of components of pasture sward, forage yield, animal carrying capacity, costs and returns.
Agron. 129 (W-25)

Ill. *Forage Crop and Pasture Management Studies*. To study (1) influence of height and frequency of cutting and intensity of grazing on longevity and productivity of forage crops, (2) effect of individual species on productivity and other characteristics of forage crops and pasture mixtures, (3) response of alfalfa and red clover to various P carriers at different soil pH levels.
Agron., Soils 15-380

Ill. *Legume-Grass Mixtures for Hay Production*. To (1) learn effect of various grasses on prevention of heaving in alfalfa; (2) measure yield of grasses in combination with alfalfa, sericea, and birdsfoot trefoil; (3) evaluate grasses in combination with alfalfa, trefoil, and sericea in weed control; (4) study longevity of above grasses with seven grass combinations; and (5) study establishment, yield, and survival of sericea lespedeza, alfalfa, and birdsfoot trefoil under different fertility levels.
Dixon Springs 40-303

Ill. *Pasture Investigations. -- IV. Intensity of Grazing*. To study efficiency of heavy and light grazing on carrying capacity and gains in weight, and (2) effects of these two methods of management on stands, cover, and erosion.
Dixon Springs 40-304

Ill. *The Effect of Mowing and Fertilization on Pasture Vegetation*. To (1) study effect of mowing and fertilization, under grazing conditions, on productivity of desirable vegetation, and prevalence and control of weeds; (2) study influence of these treatments on botanical composition, maintenance, accession, and eradication of plant species; (3) study chemical compositions of species and forage samples where warranted; and (4) observe and record animal preference, if any, for vegetation from various treated plots.
Dixon Springs 40-331

Kans. *Pasture Improvement Investigations. Pasture Management*. Study methods to improve production and use by means of management, fertilization, burning, and grazing and improved strains; and to develop improved means to establish and renovate pastures on plowable and nonplowable land.
Agron. 96. Coop. ARS

Kans. Factors Influencing Profitable Grass Utilization and Sound Pasture Management. -- 5. Effect of Burning Bluestem Pastures. To determine the effect of burning bluestem pastures on (1) cattle gains, conditions, and stocking rate; and (2) vegetation, its utilization, and on the soils.
Anim. Husb., Agron. 253-5

Ky. The Effect of Various Kinds of Pasture and of Management Practices on Maintaining High Milk Production. To evaluate various pasture forages and pasture management practices for the maintenance of high milk production.
Dairy, Agron. 1006

La. Pasture Development and Management for Beef Cattle. Study methods for development and management of pastures for beef cattle which will have maximum carrying capacity.
Anim. Indus., Crops and Soils 770

Mich. Pasture and Grass Establishment, Management, and Utilization. To secure information that will lead to improvement of pastures in Michigan--specifically, to secure information (1) about pasture crops, their composition, culture and management; (2) on place of pastures in soil conservation program; how they affect productivity of soil as well as preventing erosion; and (3) on nutritive value of different pastures for dairy cattle and other livestock.
Farm Crops 49. Coop. USDA

Minn. Forage Crop Production and Management. -- 2. Pasture Renovation Studies. To determine best techniques in establishment and management of grasses and legumes for pasture and hay.
Agron., Pl. Genet., Soils, Anim. and Dairy Husb. 1302-2.
Coop. SCS

Miss. Seasonal Carrying Capacities of Different Types of Pastures Under Farm Conditions. To learn (1) carrying capacities of different types of pasture; (2) production responses associated with different levels of fertilization; (3) costs associated with different types of pastures and different levels of fertilization.
Agr. Econ. HA-18

Miss. The Value of Irrigation in Maintaining Year-Round Pastures of High Quality. To learn value of irrigation in terms of economic yield and quality of forage by: 1. obtaining stands in drought periods; 2. learning optimum rate and frequency of application of irrigation water to maintain production; 3. learning best fertilizer rates and analyses to be used with irrigation; 4. period and amount of production of various forages to maintain continuous production of high quality forage; and 5. effect of irrigation on incidence of diseases, insects and weeds.
Agron., Crops HC-16

Miss. Effect of Pasture Irrigation on Milk Production Per Acre and Per Cow. To (1) determine effect of irrigation of a temporary summer grazing crop on carrying capacity, milk production per acre, and distribution of grazing, and (2) measure any increase in carrying capacity, milk production per acre, or distribution of forage production of annual winter grazing crops resulting from use of irrigation to insure establishment and increased fall growth.
Dairy Husb. HG-5

Mo. Treatment of Permanent Pastures. -- a. The Permanance of Grass-Legume Sod. To study soil treatments for the rejuvenation of drought injured and rundown permanent grass sods, particularly the bluegrass area of northwest Missouri; studying carrying capacity of different grass species that have received different soil treatments under practical grazing conditions; and survival of different species under different soil treatments.
Soils 99

Mo. The Improvement of Pastures with Legumes. To determine which legumes to use with adapted grasses for profitable pasture production under different conditions of soil, weather, and use.
Field Crops 213. Coop. USDA

Mont. Range Forage Production Changes Through Water Spreading Practices. To determine effect and value of diverting waste water from small drainages onto suitable areas for increasing quality and quantity of forage.
Anim. Indus., Range Mgt. MS 875. Coop. USDI--Bur. of Land Mgt. and Geol. Survey

Nebr. Irrigated Pastures for Dairy Cattle. To (1) develop irrigated pasture plan for dairy cattle, which will be suitable for Eastern Nebraska or similar areas, covering determination of plant species most suitable and management of pasture with respect to rate and time of fertilization and grazing; (2) determine irrigation requirements for high producing pastures and evaluate factors which may influence amount of water required during each irrigation period; (3) determine if addition of abundant pasturage to a good feeding program would affect breeding efficiency, health, milk production, and length of productive life of dairy cattle; (4) observe effect of use of abundant pasturage upon cost of milk production; (5) determine to what extent usual seasonal variations in Vitamin A value of milk can be affected by use of irrigated pastures; (6) determine what return can be expected in this area, from land used for irrigated pasture; and (7) determine relationship between oxidized flavor in milk and amount of pasture used in the ration.

Dairy Husb., Agr. Engin. 378

Nev. Comparative Irrigation Requirements and Crop Yields, Under High Water Table Conditions, of Pasture Grasses and Legumes with Normally Different Average Rooting Depths. To learn, under high water table conditions, for different pasture grasses and legumes (1) comparative quantitative seasonal irrigation requirements, (2) comparative required irrigation frequencies, (3) comparative yields under irrigation regimes, (4) comparative water use efficiency of plants studied, in terms of dry weight yield vs. weight of water applied.

Farm Devlpmt. 22. Coop. ARS

Nev. Management of Crested Wheatgrass Range Pastures to Delay Encroachment by Undesirable Brush. To (1) find relation of different grazing practices to re-establishment of sagebrush and rabbitbrush in newly seeded range pastures; (2) determine grazing management practices for prolonging productive life of crested wheatgrass stands that have been re-invaded by brush; and (3) measure rates of decline in productivity of mixed brush and crested wheatgrass stands under different grazing practices.

Agron., Anim. Husb, Range Mgt. 95 (W-25). Coop. USDI, ARS, FS

N. Mex. Artificial Revegetation of Desert Grassland Range in New Mexico. To determine these points with respect to desert grassland range: (1) sites suitable for revegetation, (2) adapted species and varieties, (3) best methods of soil preparation and planting, (4) grazing value of adapted species, and (5) factors affecting reproduction of adapted species.
Anim. Husb. 25. Coop. SCS

N. Mex. Restoration, Under Grazing Use, Forage Crop Appraisal and Livestock Production of Desert Grassland Range. To determine (1) effect of light-moderate, full-proper, and over use on rate of recovery of deteriorated desert grassland-range; (2) accuracy with which forage production may be appraised by estimate and from precipitation records; and (3) livestock production of desert grassland range under conservative level of stocking.
Anim. Husb. 27

N. Y. (Cornell) The Development of a System of Grassland Farming Adapted to the Hill Lands of Southern New York. To (1) learn best methods to use in improving areas in Class 1 and 2 lands of Southern New York for raising hay and silage crops and improving pastures for dairy young stock, and to demonstrate these improved methods to farmers; (2) determine value of promising grasses and legumes grown at different fertility levels and develop cropping using these crops; and (3) integrate pasture and other field production into a practical system of livestock production.
Agr. Econ., Agron., Anim. Husb. 42

N. C. Pasture Irrigation. To (1) study feasibility of irrigating pastures under soil and climatic conditions existing in North Carolina; (2) investigate effect of irrigation upon nutritive value and productive capacity of pastures; (3) study effect of irrigation upon management and fertility requirements of some pasture plants and mixtures of plants; (4) develop methods and determine best systems of irrigating pastures; and (5) determine design requirements for irrigating equipment.
Agron., Anim. Indus. 10

Oreg. Evaluation and Management of Western Oregon Pastures and Ranges. To (1) develop methods of evaluating carrying capacity and forage use of western Oregon pastures and ranges; (2) develop adequate system of pasture use and production records as aid to improve management; (3) correlate basic environmental and climatological data with pasture production to determine importance of these factors in improved management program; (4) determine phenological development of important western Oregon forages as basis of establishing proper grazing season and rotation; (5) establish a permanent inventory system to index beginning point, enable measurement of progress thru management; and basis for evaluation of range and pasture conditions; and (6) complete western Oregon problem analysis as basis for project revision and new lines of experimentation.
Anim. Husb., Farm Crops 160-2

R. I. Managing Pastures Under Rhode Island Conditions for Maintaining the Legumes and for Sustained Yields. To determine (1) which of four management systems will best maintain ladino clover in combination with a single grass -- a. close frequent grazing; b. moderate less-frequent grazing; c. silage cut followed by a; and d. silage cut followed by b; (2) gains in weight and size of heifers on these pastures; and (3) if factors other than grazing management may be more important in maintaining legumes in pastures.

Pl. Physiol., Anim. Husb., Agron. 703

Tenn. Pasture Fertilization and Forage Quality Studies. To (1) determine phosphate and potash requirements of permanent pastures on representative soil series in the state, (2) determine if a large initial fertilizer application or smaller annual application are the better practice, (3) study effect of nitrogen on yield and species composition of pastures, and (4) study effect of fertilization on chemical composition of forage.

Agron. 40. Coop. TVA

Tex. Control of Weeds and Improvement of Grasses on Ranges. To (1) assemble and incorporate all pertinent data obtained to date on studies under former projects 415 and 389; (2) learn relative value of certain range management practices for bitterweed control; (3) learn effect of certain range management practices on native vegetation and production of livestock and livestock products; (4) learn desirability of deferred rotation grazing as compared with continuous grazing; and (5) learn value of mechanical and chemical methods for bitterweed control.

Range and For., Anim. Husb. 902

Utah The Improvement of Irrigated Rotation Pastures. To (1) find more productive grass and legume mixtures for irrigated land, (2) evaluate different species of grasses and clovers as to relative production, (3) determine differences in palatability of different mixtures grazed by dairy cattle, (4) evaluate different strains of same species, and (5) determine adaptability of ladino clover to Cache Valley climatic and pasture conditions.

Dairy 333. Coop. ARS

Wash. Improved Mid-Summer Range Forage for Beef Cattle in Eastern Washington. Test mid-summer grazing value of selected grass species for beef cattle under eastern Washington range conditions.

For. 1339

Wis. Improvement of Pasture Renovation Methods. To (1) develop a better implement for renovation, one that will be reasonable in cost of operation, effective in killing quackgrass and other weeds, and capable of producing a satisfactory seedbed for forage crops, (2) learn relative effectiveness of herbicides in conjunction with implements used in renovation.
Agron., Agr. Engin. 1024

Wyo. The Selection and Management of Grasses for Mountain Ranges. To (1) establish variety trials in grass nurseries at different elevations, including the testing of South American grasses; (2) make individual plant selection studies, especially on crested wheatgrass; (3) establish variety trial grasses on range types; and (4) develop management practices on variety trial grasses.
Agron. 509

VIII. PASTURE AND RANGE UTILIZATION

Ala. Investigations of the Changes in Chemical and Physical Properties of Pasture Herbage that Influence their Utilization and Nutritive Value for Grazing Animals. To (1) determine with grazing animals seasonal distribution of digestible nutrients furnished by various forages adapted to several soil types and climate of Alabama; (2) study seasonal changes in physical and chemical properties of pasture plants and relation of these to palatability and nutritive value; (3) devise grazing management practices to promote continued optimum animal production from established swards.
Anim. Husb. and Nutr. 423

Ariz. Nutritional Studies on Arizona Range Plants and Cattle. To determine (1) cobalt, manganese, copper and molybdenum content of major forage plant species eaten by range cattle; and (2) amount of these minerals occurring in blood and liver of range animals -- with attempts to correlate a deficiency or toxicity condition with a change in composition of these minerals.
Anim. Path., Anim. Sci. 183

Calif. Nutritive Value of Specific Range Forage Species as Influenced by Seasons, Fertilization, and Management. To learn (1) techniques for measuring consumption, a. esophogostomy, b. clipping, c. hand selection, d. reference substances - lignin, chromic oxide, chromogens, (2) nutritive value of specific range species, a. chemical composition, b. digestibility, c. mineral availability, d. fiber utilization.
Anim. Indus., Agron. 1670 (W-34). Coop. FS

Colo. Improving Sagebrush Lands to Obtain Maximum Range Livestock Production. -- C. Improvement by Better Grazing Systems. To determine most practical and economical methods of improving sagebrush rangelands of low productivity by using following methods singly or in combinations: a. eradication of sagebrush, b. artificial reseeding of abandoned croplands and treated sagebrush lands to adapted forage plants, and c. use of scientific grazing systems and other improved livestock management practices.

For. and Range Mgt. 65c

Colo. An Investigation of Unidentified Nutritional Factors in Alfalfa and Certain Range Plants. To (1) study and identify unidentified nutritional factors in alfalfa and various browse types indigenous to Colorado rangeland, which are known to enhance the over-all value of rations to which they are added; (2) determine manner in which such substances, as stated above, act to supplement or improve rations in which they are included; and (3) determine optimum levels of supplementation of above mentioned factors.

Anim. Indus. 176

Colo. The Value of Native and Seeded Range Grasses and Supplementation Required in the Nutrition of Beef Cattle. To learn (1) nutritive value of native and seeded range grasses grazed in rotational pattern, (2) chemical analysis of seasonal changes in nutrient content of native and seeded range plants, (3) losses from range cover to rodents, insects, weathering, and cattle trampling, (4) effect on beef production of protein supplementation regulated to balance seasonal nutrient variation in range grasses.

Anim. Invest. 229 (W-34)

Ga. The Fattening of Beef Calves on Winter Pasture. To learn (1) value of different winter clovers and grasses for fattening beef calves, (2) effect of addition of grain to steers while fattening in winter pasture, and (3) effects of above feeds on rate of gain, economy of gain, finish, market price, meat quality, refractive index and health of animals at 14 - 16 months.

Anim. Indus. 51

Ga. Raising Dairy Heifers on Improved Pastures. To determine the suitability and value of various types of pastures and feeds for growing out dairy heifers.

Anim. Indus., Chem. 55

Ga. The Relative Value of Various Summer and Winter Pastures for Lactating Dairy Cows. To learn (1) relative value of various varieties of oats, Abruzzi rye, and other winter crops; (2) relative value of Starr millet or other temporary summer forage crops and Coastal Bermuda grass, grown under varying fertility levels.

Agron., Anim. Indus. 212

Hawaii Range Beef Cattle Nutrition Studies in High Rainfall Areas. (1) Obtain information on nutritive value of forages produced in humid rangeland areas on which better beef production and range management practices may be based. (2) Learn factors governing grazing value of humid rangeland on: native forages, native + introduced forage species, improved forage species. Learn: (3) need for supplemental feeding of range cattle under above conditions; (4) effect of range fertilization and land preparation on nutritive value of selected forages.

Anim. Sci., Agron., Soil Sci. 261 (W-34)

Idaho Beef Cattle Nutrition on Seeded and Native Forages in Idaho. To learn nutrient content, total digestible nutrients, and digestible energy of forage consumed by cattle when grazing at different intensities and seasons of use on: seeded areas and native forage; (2) learn effect of intensity of grazing on nutrient intake and livestock production; (3) learn need for and value of various nutritional supplements for cattle subjected to above grazing treatments; (4) apply nutritional results obtained to better beef cattle production and range management practices.

Anim. Husb., Vet. Sci. 296 (W-34). Coop. FS, USDI-Bur. of Land Mgt.

Ill. Pasture Investigations. -- II. Grazing Values of Mixed Legumes and Grasses. To study pasture yields of a number of mixtures by (1) mowing, (2) hay production, (3) seed production, (4) nutritive value, (5) palatability and persistence of stand of a number of mixtures.

Dixon Springs 40-302

Ill. The Use of Pure Seedings for Rotation Pasture. To study management of pastures seeded to pure seedings for sheep for purpose of trying to (1) lengthen pasture season for sheep thru seasonal grazing, (2) ascertain changes in botanical composition of pastures, (3) determine yields, consumption, and animal gains or losses on various pastures; and (4) maintain species longevity by proper grazing management and additions of fertility as indicated by tests.

Dixon Springs 40-305

Ill. A Rotation to Provide Year-Long Pasture and Feed for a Flock of Breeding Ewes. To study a small grain, legume, grass rotation to provide continuous pasture and feed for a flock of breeding ewes.
Dixon Springs 40-308

Ind. The Production of Beef on Various Legume-Grass Mixtures and Permanent Grass Pastures. To (1) compare productive capacity of permanent pastures under a system of (a) continuous grazing, unfertilized, and (b) rotation grazing, fertilized; learn (2) influence of an application of commercial nitrogen upon productive capacity; (3) production of a permanent pasture under a deferred summer grazing system; and (4) productive capacity of a permanent pasture renovated and seeded with Ladino clover and Birdsfoot trefoil. To compare (5) productive capacity of five different legume-grass mixtures under similar grazing and management conditions; (6) production of a Ladino clover-bromegrass mixture under a high and low fertility level; and (7) T.D.N. production of a corn, wheat, clover-timothy hay rotation and all the pasture under study.
Anim. Husb., Miller-Purdue Farm, Agron. 474. Coop. ARS

Ind. Effects of Various Grazing and Harvesting Systems on the Sward of Mixtures of Ladino Clover-Bromegrass and of Birdsfoot Trefoil-Kentucky Bluegrass. To (1) determine system of grazing giving optimum forage yields for mixtures of Ladino clover-bromegrass and birdsfoot trefoil-bluegrass; (2) compare yield and consumption of forage as determined by cage method of harvesting with same determined by calculation or basis of total digestible nutrient needs of grazing animals; and (3) determine changes in botanical composition which result from several grazing treatments.
Agron. 628

Ind. The Effect of Stage of Maturity on Utilization of a Pasture Mixture by Dairy Cattle. To determine effects of stage of maturity of pasture mixture on use by producing dairy cows.
Dairy Husb., Agron. 779

Kans. Factors Influencing Profitable Grass Utilization and Sound Pasture Management. -- 3. Effect of Grazing System on Livestock and Vegetation. To study effects of time and intensity of grazing bluestem pastures on livestock gain and condition, on range condition, and trend in terms of vegetative population with reference to range site conditions, and on degree of use and vigor of vegetation.
Anim. Husb., Agron. 253-3

Kans. Pasture Evaluation Under Grazing. Learn the effect of varying degrees of grazing use on pasture strains, varieties, species and mixtures and on pasture practices; use grazing pressures in screening of materials and practices, and evaluate responses to to grazing in terms of dry matter yield, forage quality, persistence, season of availability, resistance to drought, changes in plant populations, soil fertility levels, soil structure, and water relations.
Agron., Anim. Husb. 472

Ky. Comparison and Evaluation of Several Techniques for Measuring the Nutritive Value and Palatability of Pasture Forage for Ruminants. To compare, evaluate, and further perfect the following indicators for learning digestibility and consumption of pasture forage by ruminants: lignin, chromium oxide, fecal nitrogen, and forage nitrogen.
Anim. Husb. 1004 (S-12)

La. The Value of Irrigation of Forage Crops for Dairy Animals in Louisiana. Study effects of irrigation on temporary and permanent pasture in terms of: variations in quality and quantity of forage production as measured by animal response; interrelationship among irrigation, crop response, animal response and climate.
Dairy, Agr. Econ. 930

Md. Pasture Species for Beef Production. To (1) compare beef gains, carrying capacities and forage dry matter production per acre with following combinations of pasture species: a. Kentucky bluegrass-timothy-white clover; b. Orchard grass-red clover- Ladino clover; c. Reed canary grass-red clover-Ladino clover; d. Bermuda grass-Crimson clover-plus nitrogen.
Agron. B-56-j

Mich. The Nutritive Value of Pastures for Dairy Cattle. (1) Learn nutritive value of existing forage crops for dairy cattle. (2) Study nutritive value of new forage crops. (3) Evaluate various systems of pasture management. (4) Study value of various supplements when fed with pastures varying in quality. (5) Develop various pasture programs to obtain most productive and economic ones for state. Study (6) rates and kinds of grain feeding with various types of pasture; (7) economic treatment of resulting pasture data.
Dairy, Farm Crops, Agr. Chem., Agr. Econ. 857

Miss. A Study to Determine the Relative Value of Different Winter-Grazing Crops for Finishing Weanling Calves. To determine relative value of various crops for production of winter grazing as measured by 1. rate of gain and total beef produced per acre; 2. cost of beef production; and 3. length of grazing period and tendency to winter kill.
Anim. Husb. HE-8

Miss. Milk Production in Relation to Year Round Grazing Systems. To (1) determine comparative value of various permanent and temporary grazing crops for milk production measured by grazing performance of dairy cattle; (2) determine cost and economic returns from various crops; (3) evaluate effect of sod seeding winter grazing crops in permanent summer sods on total yearly forage production, distribution of forage production, and on stand of summer crops; and (4) evaluate effect of sod seeding and conventional seed bed preparation on forage production of both a winter and summer temporary grazing crop.
Dairy HG-1

Miss. A Comparison of Soiling Vs. Grazing Summer Pasture Crops. To learn (1) use of tall growing summer forage crops harvested by "close folding" rotational grazing, and by soiling, (2) effects of soiling vs. grazing on feed consumption and milk production, (3) interaction of feeding systems with high atmospheric temperatures as measured by feed consumption and milk production.
Dairy HG-6

Mo. Roughage and Pasture in the Production of Late Lambs. To (1) produce late lambs without any grain feeding of either ewes or lambs; and (2) determine carrying capacities and other information which will help establish best year-round pasture program for sheep.
Anim. Husb., Field Crops 142

Mo. Pasture Improvement. -- c. Periods of Maximum Response to Different Pastures by Steers. To determine periods of greatest gain for cattle on various pastures.
Anim. Husb. 154-c

Mont. Value of Pasture Grasses Under Grazing Conditions. To determine value and place in grazing systems of different grasses adapted to Montana environments.
Agron., Soils M. S. 826

Mont. *The Usage of Pasture Grasses by Dairy Cattle.* To determine which type of pasture management will result in (1) greater consumption of total digestible nutrients, (2) greater yield of total digestible nutrients per acre, (3) greater milk and fat production, (4) better flavored milk, and (5) greater milk production economy.
Dairy Indus. M. S. 908

Nebr. *Development and Utilization of Improved Pasture Techniques for the Evaluation of Forage Grasses.* (1) Measure relation between productivity and palatability of different grasses by: animal performance on pasture, forage production from caged areas of pastures clipped periodically to simulate grazing, calculated total digestible nutrients from forage production and chemical analyses of forages from caged areas. (2) Develop method of harvesting small plots that more nearly duplicates effects of grazing on forage plants than procedures formerly used; learn if selected clipping methods adequately reflect differences due to grazing intensity. (3) Develop methods of study of relative palatability and its effect on rate of intake.
Agron., Anim. Indus. 482 (NC-11). Coop. ARS

Nebr. *The Influence of Different Levels of Stocking on Summer Livestock Gains and the Consequent Changes in Botanical Composition, Range Condition and Quality of Forage on Western Nebraska Rangeland.* Learn: (1) effect of three levels of stocking on summer gains of livestock on rangeland; (2) influence of varying degrees of use on condition and botanical composition; (3) seasonal trends in nutritive content of major forage producing species.
Agron., Anim. Husb. 594

N. Y. (Cornell) *A Comparison of Different Intensities of Grazing with Green Crop Feeding of an Improved Pasture Mixture.* Compare different intensities of grazing with green crop feeding of an improved pasture mixture by collecting data on: milk production per cow; milk production per acre; seasonal carrying capacity; herbage consumption per cow; chemical composition of herbage and its relationship to consumption and digestibility; botanical composition; cost of production.
Anim. Husb., Agron. 68 (NE-24)

N. C. *Ladino Clover-Grass Pastures for Fattening Cattle.* To study (1) methods of using Ladino clover-grass pastures to fatten cattle for market; (2) response of steers grazing Ladino clover-grass pastures to graded levels of grain; (3) forage consumption and digestibility by steers on graded levels of grain; (4) effects of various winter treatments on subsequent performance of grazing steers receiving graded levels of grain; and (5) contribution of clover and of grass in Ladino clover-grass pastures.
Anim. Indus. 20

N. C. Statistical Studies of Techniques Used in Pasture Evaluation. To (1) improve pasture evaluation techniques thru study of nature and magnitude of errors in (a) grazing trials, (b) mechanically-harvested small plots, (c) cage and mower-strip methods, and (d) indicator methods; (2) provide statistical consultant services to other S-12 pasture technique studies
Stat. 49 (S-12) Coop. ARS

N. C. Evaluation of Pasture Species and Mixtures Under Various Management Systems with Grazing Animals. (1) Measure forage production, as reflected in animal performance and plant yield, from known adapted pasture species. (2) Correlate agronomic measurements of pasture yield with animal performance. (3) Develop and assess techniques for predicting (1) above thru the use of biochemical assay and statistical models.
Field Crops, Anim. Indus., Stat. 130. Coop. USDA

N. C. The Value of Forage Species Alone and in Mixture Under Various Pasture Management Systems for Lactating Dairy Cows. (1) Measure yield (in milk production and body weight gains) of selected grass, grass-legume, and legume pastures. (2) Study consumption and use of pasture forages by individual cows to evaluate possible differences in performance of individuals.
Anim. Indus., Field Crops 132

N. Dak. Value of Crested Wheatgrass and Crested Wheatgrass-Alfalfa Pastures for Spring Grazing. To learn the grazing capacity of crested wheatgrass and crested wheatgrass-alfalfa pastures when used for spring pasture for beef cattle.
Anim. Husb. 9-4

Ohio Pasture Species for Beef Animals. To learn (1) if an old stand of birdsfoot trefoil is more productive for beef cattle pasture than a new seeding of alfalfa-Ladino clover-bromegrass; (2) how long alfalfa and Ladino will remain in a pasture with a two-paddock rotation system. (3) Further explore feasibility of using Reed canary grass with birdsfoot trefoil for beef cattle pasture.
Agron. 34-5

Ohio Influence of Ladino Clover and Birdsfoot Trefoil Pasture on Reproductive Efficiency of Sheep. To (1) compare Birdsfoot Trefoil and Ladino Clover as principal legume for permanent sheep pasture; and (2) determine effect of the two legumes on gain efficiency, animal health, and reproductive efficiency.
Vet. and Anim. Sci. 34-7

Ohio

Pastures and Their Supplementation for Pigs. To (1) get data on relative performance, returns, and killing qualities of March and April farrowed pigs that are full fed, and of January or February farrowed pigs that are started earlier and given a limited amount of feed on pasture so the two groups will finish at about the same time, (2) secure further data on amount of protein concentrate needed by full fed spring pigs on Ladino clover or alfalfa pasture, (3) compare different pastures, as bluegrass, red clover, alfalfa, Ladino clover, mixture of legumes, meadow mixture, annual or emergency pastures, (4) compare feeding in dry lot and on pasture.

Anim. Sci. 44

R. I.

Zero-Pasture as a Summer Maintenance Program for Dairy Cattle. To determine advantages or disadvantages together with economy of maintaining dairy herd under dry lot conditions where forage is chopped and self fed in the lot, including influence on production of 4% fat corrected milk, influence of body weight and general herd health, forage production from pasture when forage is cut, chopped and dry lot fed instead of grazing, and determining estimated costs involved in labor and machinery use in handling forage.

Agron., Anim. and Dairy Husb., Agr. Econ., Agr. Chem., Pl. Physiol. 303

S. C.

Grazing Crops for Turkeys. To (1) compare gains in weight, feed consumption, and market finish and condition of turkeys raised on range vs. confinement; and (2) compare various range crops including alfalfa, Bermuda grass, ladino clover, lespedeza, soybean, and Sudan grass, and various forage combinations for growing turkeys.

Poultry Husb. 73

S. C.

Growing and Fattening Steers on Common and Coastal Bermuda Pastures. To learn (1) grazing time of these pastures, (2) "carrying capacity" of pastures, (3) daily gains, gains per animal, gain per acre, and cost of gains by steers on these grasses.

Anim. Husb., Chem. 107 (S-12)

S. Dak. Nutritive Value of Grasses and Hays of the Northern Great Plains. To obtain data on composition, digestibility, and productive value of pastures and hays. More specifically: 1. to learn by feeding trials, digestion, and where necessary, metabolism trials, the nutritive value of grasses cut for hay and stored at shooting stage, seed ripe stage, and mature stage, using hay from different parts of the state representing different soil, weather and grass conditions; 2. to store sufficient hay by stacking or other methods that a feeding trial and/or digestion trials can be conducted each year for five years on hay stored 1 year, 2, 3, 4, and 5 years, to stabilize feed supplies and livestock production by storing feed grown in good feed production years to provide adequate feed in dry years; 3. to formulate a livestock program from the information known and gained in 1 and 2 as to digestibility, feeding value, protein, minerals, quality of forage, time of making maximum use of pastures and hays, supplements needed, etc.; and 4. to find a simpler method for determining digestibility of growing pasture grass and feeds using steers that will reduce cost, time, labor involved, etc.
Anim. Husb. 120

Texas Grazing Management of Perennial and Supplemental Annual Pastures. Learn most profitable system of grazing management on several types of perennial and supplemental annual pastures. Systems to be tested are: moderate continuous grazing, heavy continuous, and rotational grazing.
Anim. Indus., Agron. 1019

Utah Grazing and Livestock Management of Reseeded Abandoned Farm and Depleted Range Lands. To determine (1) how and when areas seeded to crested wheatgrass may best be grazed, and (2) the grazing practices conducive to the largest livestock production consistent with requirements for maintaining the productivity of reseeded areas and for protecting the land.
Anim. Husb. 291. Coop. SCS, FS

Vt. Consumption and Utilization of Forage by Chickens. Learn (1) preferences for and kinds and amounts of forage, feed and other substances consumed by birds reared on range; (2) costs and efficiency of gain, and grade and market finish made by birds reared on different kinds of pastures as compared to similar birds reared in confinement; (3) viability, rate of growth, feed efficiency, and laying ability of hens reared on pasture, compared to those reared in confinement, up thru first year of laying.
Poultry 61

Va. Yield and Herbage Quality Under Two Systems of Grazing. To measure quality and quantity of herbage production under continuous grazing of one pasture vs. grazing program where several mixtures in different fields are grazing in rotation.
Anim. Husb., Agron. 86037

Wis. Forage Composition and Crop Management as Related to Reproductive Disorders in Cattle on Marsh Areas in Central Wisconsin. Survey in detail plant populations in pastures where abortions have occurred and in those where occurrence is seldom; correlate plant species present with same or other species with known adverse effect. Feed experimental animals plants which might cause abortion in cattle. Study management of unfavorable pastures to see if time of pasturing, stage of growth, season, or past treatment may be involved. Experiment with various treatments or seedings to test factors previously shown as sources of difficulty.
Agron., Vet. Sci. 957.

Wyo. Grazing Studies on Seeded Pastures and Native Range. Learn (1) effect of three degrees of forage use of high mountain range on vegetational composition and cattle gains, (2) same when fed to sheep, (3) comparison of cattle gains from grazing three seeded grass species at optimum period of use with gains from native shortgrass, (4) effect of light use on rate of recovery of overgrazed shortgrass range and sheep gains from pastures as compared with good range lightly and moderately grazed, (5) longevity of certain seeded grass species and sheep gains compared from pastures of these species.
Agron., Anim. Prod. 586. Coop. ARS

IX TURF

Minn. The Establishment and Maintenance of Lawns in Minnesota. To determine (1) best lawn grass mixtures for different soil types and degree of shade; (2) best means to start a new lawn using surface mulches; (3) amount and kind of topsoil needed over sandy subsoils to establish a permanent lawn; (4) best way to control crabgrass, chickweed, creeping charlie, etc.; (5) what types of soils should be aerated and best means of doing so; and (6) best fertilizer ratio, rate of application, and best times and methods of application.
Hort. 2121

N. J. Selection, Development and Evaluation of New Turf Grasses. (1) Evaluate new and standard grasses as: Kentucky bluegrasses, red fescues, bent grasses, warm-season grasses. (2) Develop turf grasses: bent grasses, Kentucky bluegrass and other turf grasses.

Farm Crops 265. Coop. USDA

N. Y. (Cornell) Establishment and Maintenance of Permanent Grass Sod on Home and Institutional Grounds, Parks, and Highways. (1) Establish tests for adaptability of new grasses to climatic conditions, disease, and suitability in different soils. In Kentucky bluegrass, there is a possibility that commercial seed from one producing area may be superior in turf producing ability to that from other areas. (2) Test mixtures of basic turf grasses with varying amounts of less expensive "temporary" grasses at varying seasons and with varying degrees of soil preparation and after-care.

Hort., Agron. 103

R. I. Availability of Surface Applications of Natural and Synthetic Nitrogen Compounds for Fine Turf. Compare nitrification rates of slow decomposing natural and synthetic N sources applied on surface and mixed in soil. Select best single source or mixture of materials to extend effects of a single fertilization thru summer season.

Chem., Agron. 3

R. I. The Cumulative Effects of Liming and Composting on Velvet Bent Turf. Learn effect of continued applications of various amounts of lime and compost on growth and vigor of velvet bent grass, the accumulation of organic matter in the soil, the rate of penetration of lime into the soil and on change of pH at various soil depths.

Agron. 210

Tenn. The Establishment and Maintenance of Turf. To (1) test improved turf grasses under Tennessee conditions, (2) learn best methods for establishing turf at different times of the year, (3) learn proper management for different kinds of turf, and (4) learn the compatibility of various turf species, and the desirability of using species combinations.

Agron. 47

X FORAGE SEEDS

Ariz. Seed Production of Forage Plants. To (1) determine seed producing potentials of new strains or varieties of forage crops, (2) develop and/or evaluate cultural practices for forage seed production, and (3) maintain stocks of breeder seed of varieties of alfalfa, grass, and millet recommended for production in Arizona by the Arizona Crop Improvement Association.
Agron. 304

Calif. Seed Damage Identification and the Evaluation of Injured Seed. (1) Develop methods to evaluate mechanically or otherwise damaged seed. (2) Learn identity of organisms associated with injured crop seed.
Agron. 1767. (WM-35)

Colo. Improvement of Laboratory Techniques in the Germination of the Seeds of Economically Important Grass Species. Develop: (1) methods for shortening germination periods of seeds of established economically important grass species; (2) laboratory techniques best adapted to germination of seeds of grass species newly learned to be of importance in western states range and pasture reseeding program.
Seed Lab., Bot., Pl. Path. 243 (WM-35)

Iowa Favorable Substrate Moisture Levels for Germination Testing of Grass Seeds. (1) Devise methods of maintaining measured moisture levels in germination substrata. (2) Learn moisture level requirements of germinating grass seeds with respect to application in conducting reproducible germination tests.
Bot., Pl. Path. 1360 (NCM-23)

Ky. Seed Yields in Kentucky Bluegrass, Orchardgrass, and Kentucky 31 Fescue. To determine practices that will improve yields and improve quality of seed of these grasses.
Agron. 157

Ky. Seed Production in Red Clover and Alfalfa. To determine (1) effects of different cultural and fertilizing practices and of insect control measures upon seed yield and quality, (2) amounts and causes of seed losses in harvesting, (3) isolation necessary to prevent significant crossing of varieties, and (4) degree of loss in crop adaptation occurring in successive seed generations produced under farm conditions.
Agron. 162. Coop. USDA

Mich. Forage Seed Production Studies. To (1) increase fertility of red clover blossoms, (2) improve harvesting methods by: better threshing technique, and proper use of defoliants, and (3) learn practical value of DDT, and other insecticides, for control of vetch weevil.

Farm Crops 10

Minn. Studies on the Attractiveness of Alfalfa Clones to Pollinating Insects. To contribute to better pollination of alfalfa by (1) evaluating attractiveness of alfalfa clones to different species of pollinating insects, (2) determining factors that affect attractiveness of alfalfa flowers to pollinators, and (3) using this information to explore possibilities of developing alfalfa varieties more attractive to pollinating insects.

Agron., Pl. Genet., Ent., Zool. 1724

Miss. Seed Production in Dallisgrass as Affected by Time of Seed Harvest, Clipping Treatments, and Carbohydrate Reserves. Investigate production of Dallisgrass seed as affected by: time of seed harvest, removal of forage before and after seed harvest, various levels of carbohydrate reserves induced by clipping treatment.

Agron., Crops HC-11, HF-2

Miss. Seed Production, and the Development of Methods of Harvesting, Processing, Storage of Legume, Pasture and Forage Crop Seed. To (1) determine soil, physiological, pathological, nutritional, and cultural factors affecting economical production of forage and pasture crop seed; (2) determine factors affecting quality and viability of forage and pasture crop seed during harvest, processing, and storage; and (3) develop methods for economical production, harvesting, processing, and storing these seed.

Agron., Engin., HB-5, RRFC-3 (S-12)

Miss. Development and Standardization of Methods and Techniques for Determining Varietal Purity on a Seed or Seedling Basis for Specific Crops. (1) Develop and perfect methods for learning varietal purity on a seed or seedling basis for specific crops. (2) Correlate lab. techniques and methods developed with mature plant identifications. (3) Prepare and publish illustrated artificial keys to varieties of crops studied.

Agron. RRFSP-1 (SM-21) Coop. AMS

N. Y.
(Cornell)

Birdsfoot Trefoil Investigations. -- 2. Birdsfoot Trefoil Seed Production. To (1) determine factors limiting seed set and maximum seed harvest and to devise ways and means of increasing seed production so that need and demand for planting stock may be met.

Agron., Engin., Pl. Path., Pl. Breeding 47-2

N. Y.
(State)

Testing the Varietal Purity and Identity of Seeds of Varieties of Perennial Forage Crops Recommended and/or Developed for the Northeast. (1) Study methods of refining trueness-to-type trial procedures. (2) Develop a quick method of measuring varietal purity and identity of alfalfa seeds thru testing seedlings for resistance to bacterial wilt. (3) Develop procedures for distinguishing types of forage crop seedlings by growing them under different combinations of temperature, daylength, and light color. (4) Devise procedures for distinguishing types and varieties of forage crop seeds by germinating them under different osmotic pressures. (5) Study other chemical, physiological, morphological, and pathological tests for identifying forage crop varieties in lab., greenhouse, or climate chamber.

Seed Invest. (NEM-22) Coop. ARS

S. C.

Pollination of Legume Crops. To investigate possible relationship between soil conditions, especially general fertility, pH level, and content of organic matter, and attractiveness to honey bees of legumes grown on soils varying according to the above conditions.

Ent. 101

Texas

Grass and Legume Seed Production. To determine (1) areas well adapted to seed production of important forage species; (2) influence of fertilizer treatments and cultural and management practices on seed production and quality; (3) effect of fertilizer treatments and management on incidence of diseases and their effect on seed yield and quality; (4) importance of using pollinating insects and controlling harmful insects; and (5) adaptation of harvesting and planting equipment for particular species and to fit peculiar needs of various regions.

Agron. 860. Coop. ARS

Wash. Environmental and Agronomic Factors of Legume Seed Production. To (1) evaluate clones, hybrids, synthetics and varieties of forage legumes, developed in other regions, for seed production potential; (2) determine relationship to seed yield of stand density, reserve food storage, fertilizer, time of flowering period under conditions of maximum pollination; and (3) cooperate with California station on their project, "The Effect of Environment of Genetic Shift and its Influence on the Forage Value of a Variety".

Agron. 1207 (W-58) Coop. ARS

Wyo. Forage Crop Seed Production. Test effect of row spacing, rates and time of N application and other factors on seed production of certain grass species.

Agron. 587

Wyo. The Use of Growth Modifiers in Production of Alfalfa Seed. (1) Screen various growth-modifying chemicals for influence on alfalfa seed production. (2) Test promising chemicals as learned under (1) on alfalfa under field conditions to determine practical recommendations.

Agron. 564 (W-58)

XI. REGIONAL RESEARCH, INCLUDING STATES WITH CONTRIBUTING PROJECTS

NC-11 The Development of Improved Techniques of Forage Crop Evaluation. A. To develop improved mechanical methods of harvesting small plots which will more nearly duplicate the effects of grazing on the forage plants than do the clipping procedures now used; and to determine if there are interactions between harvesting methods and (a) species or strains, (b) fertility levels of the soil, or (c) available moisture. B. To study the relationship existing among the following methods of determining nutritive value of forages or forage quality: (a) forage production from clipped plots and associated chemical analyses, (b) animal response in measurable products plus consideration of maintenance requirements, (c) rate of intake and digestibility of forages by animals as determined by "indicator" techniques involving the use of "chromogen" and "chromic oxide", or others, (d) the "digestible energy" method of feeding value determination as proposed by Crampton, and (e) use of the artificial rumen in determining digestibility coefficients of forages. C. To determine the relationship of data obtained in objective A to that obtained in objective B in the evaluation of small amounts of forage from production plots or breeders lines. D. To establish regional facilities to evaluate small amounts of forage from production plots or breeders lines for nutritive value if objectives A, B, and C are achieved.

Cooperating Stations: IV: Ind., N. Dak. VIII: Nebr.

NC-25 Factors Affecting the Utilization of Feed by Ruminants. To improve the utilization of roughages by ruminants with emphasis upon the utilization of the carbohydrate fraction.

Cooperating Stations: IV: Ill., Ind., Mich, Minn, Mo., S. Dak.

NC-42 Winter Injury and Survival in Field Crops. 1. Factors within the plant - Biochemical, biophysical, physiological, morphological, and anatomical characteristics which are responsible for its capacity to survive low temperatures and environmental influences associated with low temperature. 2. Factors of the environment - climatic, edaphic, and biotic phenomena which give rise to hardening or to injury associated with low temperatures.

Cooperating Station: II-A: Ohio

NCM-23 Facilitating the Marketing of Seed Through Improved Testing and Handling Procedures. 1. To improve and standardize testing methods through investigation of (a) laboratory methods of seed germination, and (b) factors affecting germination and dormancy. 2. To improve market quality of seed through investigation of seed quality as influenced by harvesting, processing and storage methods.

NE-24 The Nutritive Evaluation of Forages. 1. To evaluate various forages grown under known conditions and harvested at specific stages of maturity by determining digestible protein and digestible energy. 2. To develop methods for the nutritive evaluation of forages: these to include the use of small animals and chemical analyses. 3. To conduct animal production trials simultaneously insofar as possible.

Cooperating Stations: III: Vt. IV: Del., Maine, Minn., Md., Mass., N. H., N. J., N. Y. (Cornell) (2), Pa., R. I. VIII: N. Y. (Cornell)

NE-28 Breeding and Evaluation of Improved Varieties of Forage Crops Adapted to the Northeast. 1. To determine the establishment, persistence, and productivity of regionally selected clones, their progeny, and the experimental synthetics bred from them of alfalfa, birdsfoot trefoil, Ladino clover, smooth bromegrass, orchard grass, and timothy. 2. To relate the above performance data to observable morphologic and physiologic characteristics of the clones and their progenies and to establish selection criteria in order that more rapid and efficient progress by breeding can be made. 3. To use these materials and information in determining methods of breeding regionally adapted synthetic varieties of value in the Northeast. 4. To compare the performance and characteristics of the new experimental synthetics to standard varieties in use in the Northeast in order to determine their regional adaptation and areas of use.

Cooperating Stations: I-A: Mass., N. J., N. Y. (Cornell) (2). I-B: Md., N. H., Pa. I-C: Conn. (Storrs), Maine, R. I., W. Va. I-D: Md., N. H., Pa. I-E: Pa., Vt.

NE-29 Establishment and Management of Perennial Forage Species and Varieties for Persistent Production in the Northeast. 1. To investigate seedling establishment and early development of forage grasses and legumes as influenced by soil conditions, fertilizer practices, seeding methods, seedling management and climatic conditions. 2. To investigate the productivity, persistence and nutritive composition of perennial forage crops, as influenced by different methods of management. 3. To investigate the morphologic and physiologic characteristics of the more important forage grasses and legumes as related to their establishment and management requirements in Northeastern environments.

Cooperating Stations: II-A: W. Va. II-C: Md., R. I. V: Conn. (Storrs), Md., N. J., N. Y. (Cornell) (2), Pa., Vt.

NEM-22 Facilitating the Marketing of Seeds Through Improved Procedures for Testing the Varietal Purity and Identity of Seeds of Varieties of Perennial Forage Crops Recommended and/or Developed for the Northeast. Develop and test the validity of techniques for use in ascertaining varietal purity and identity of forage crop seeds by means of seed, seedling, or plant characteristics as follows: a. investigate the possibilities of identifying varieties by means of chemical, physiological, morphological, pathological, and other tests which could be conducted in the laboratory, greenhouse, or climate chamber; b. investigate methods of improving trial plot techniques for measuring varietal purity and identity.

Cooperating Stations: I-A: Pa., R. I. X: N. Y. (State)

S-12 Production and Evaluation of Forage Crops and Pastures in the South. 1. To develop more effective and efficient methods for determining the forage values of varieties and species of Southern pasture and forage plants grown singly and in combination under Southern conditions. (Subproject 1). 2. To determine basic genetics and breeding behavior of forage species and to develop and evaluate new and improved varieties and species adapted to the Southern region. (Subproject 2). 3. To determine the influence of specific environmental factors on the behavior of various strains, varieties and species of Southern forage crops and to determine the response of these plants to variations in environments encountered in the region and to soil and grazing management and fertilization practices. (Subproject 3). 4. To develop improved methods of producing, harvesting, processing, and storing seed of Southern forage crops. (Subproject 4).

Cooperation Stations: I-A: Ark., Ga., Ky., La., Miss., Okla. I-B: Ark., Puerto Rico, S. C., Texas, Va. (2). I-D: La. I-E: N. C., Okla. II-A: Fla., Tenn., Texas. II-B: S. C. II-D: Miss. IV: Ga., Va. VIII: Ky., N. C., S. C. X: Miss.

SM-21 Factors Influencing Market Quality of Seed. (1) To improve and standardize tests for seed germination and mechanical purity. (2) To develop laboratory tests for seedling vigor and trueness-to-variety or type. (3) To investigate the physiology of seeds during curing, storage and germination.

Cooperating Station : X: Miss.

W-25 Ecology and Improvement of Brush-Infested Range Lands. (1) To determine ecological factors responsible for changes in range plant cover. (2) To develop grazing management practices that will improve ranges which have become less productive through invasion or spread of brush.

Cooperating Stations: V: Wyo. VI: Ariz., Idaho, N. Mex., Oreg., Utah, Wash., Wyo. VII: Calif., Colo., Hawaii. VIII: Nev.

W-40 Breeding Forage Plants with Superior Performance, Nutritive Value, and Seed Yielding Capacity. 1. Evaluate and catalogue germ plasm. 2. Develop and adapt methodologies to use as criteria in breeding. 3. Determine breeding behavior of germ plasm. 4. Develop superior varieties.

Cooperating Stations: I-A: Utah. I-B: Colo. I-C: Nev. IV: Oreg.

W-47 Developmental Aspects of Root Growth in Forage Plants. 1. To investigate the root development of selected forage plants in order to advance the understanding of the structural and physiological variability which is observed in the roots of Western forage plants. 2. To ascertain the effects of beneficial and harmful microflora on root development, particularly in relation to nodulating bacteria of legumes. 3. To study the variability in root growth in response to temperature, aeration, and the environmental stresses present in the root zone of forage plants. 4. To correlate root development with observed variaability in top or shoot growth.

Cooperating Stations: II-A: Ariz., Hawaii, Oreg. II-C: Colo.

W-58 Factors Affecting Seed and Vegetative Reproduction in Forage Crops. 1. To determine the effects of photoperiod, temperature, and moisture on reproductive potential. 2. To determine the effects of cultural and chemical treatments on reproductive potential. 3. To determine the effects of temperature, moisture, light and latitude on genotypic change.

Cooperating Stations: I-B: Mont. I-D: Calif., Hawaii, Nev. II-C: Ariz. X: Calif., Wyo.

WM-35 Facilitating the Marketing of Seed Through Improved Testing Procedures. a. To develop, improve, and standardize laboratory methods for sampling and determining germination, mechanical purity, seedling vigor, and seed identity. b. To develop methods of evaluating mechanically and otherwise damaged seeds. c. To obtain information on the physiology and biochemistry of seed so as to relate these factors to seed testing procedures. d. To develop improved methods of identification of seed pathogens applicable to improved seed testing procedures.

Cooperating Stations: X: Calif., Colo.

OTHER REGIONAL RESEARCH PROJECTS REFERRED TO IN THIS SUMMARY BUT SUMMARIZED ELSEWHERE

NC-7 New Plants - The Introduction, Multiplication, Preservation, and Evaluation of New Plants for Industrial and Agricultural Use. See ARS-23-8-12 for objectives.

NC-37 Improvement of Alfalfa and Other Forages Through Basic Studies in Genetics and Pathology. See ARS-23-8-17-b for objectives.

NE-1 Causes and Prevention of Reproductive Failure in Dairy Cattle. See ARS-23-8-5 for objectives.

NE-9 Discovery and Preservation of Valuable Plant Germ Plasm. See ARS-23-8-12 for objectives.

NE-22 Soil-Plant-Water Relationships as a Basis for Irrigation. See ARS-23-8-3-a for objectives.

S-9 The Introduction, Multiplication and Evaluation of New Plants for Industrial and Agricultural Use and the Preservation of Valuable Germ Plasm. See ARS-23-8-12 for objectives.

W-6 The Introduction, Multiplication, Preservation, and Determination of Potential Value of New Plants for Industrial and Other Purposes. See ARS-23-8-12 for objectives.

W-29 Soil-Water-Plant Relationships Under Irrigation. See ARS-23-8-3 for objectives.

W-34 Range Livestock Nutrition. See ARS-23-8-4-a & b for objectives.

LIST OF COMPILATIONS OF FEDERAL-GRANT RESEARCH PROJECTS AT STATE AGRICULTURAL EXPERIMENT STATIONS

ARS-23-8: Part Numbers	Subject-Matter Area	Title of Section
1	Agricultural Chemistry	Agricultural Chemistry
2	Agricultural Economics	a. Prices, Incomes, & General Studies of Commodities & Industries
		b. Farm Management
		c. Land Economics
		d. Farm Finance & Taxation
3	Agricultural Engineering	a. Land & Water Use & Development
		b. Power Machinery & Equipment
		c. Farm Structures & Materials
4	Animal Husbandry	a. Beef Cattle
		b. Sheep & Goats
		c. Swine
5	Dairy Husbandry	Dairy Cattle
6	Dairy Technology	Dairy Technology
7	Entomology & Economic Zoology	a. Field Crop Insects
		b. Fruit, Nut & Vegetable Insects
		c. Miscellaneous Insects & Economic Zoology
		d. Insecticides
8	Field Crops	a. Cereal Crops
		b. Oil, Fiber, Tobacco & Sugar Crops
9	Food Science & Technology	a. Food Chemistry, Microbiology, Sanitation & Public Health
		b. Food Engineering, Processing, Product and Process Development, Utilization and Waste Disposal
		c. Food Quality & Standards, Acceptance, Preference, & Marketing
10	Forage Crops, Pastures & Ranges	Forage Crops, Pastures & Ranges
11	Forestry	Forestry

ARS-23-8: Part Numbers	Subject-Matter Area	Title of Section
12	Fruits & Nuts	Fruits & Nuts
13	Home Economics	a. Human Nutrition
		b. Housing
		c. Clothing & Textiles
		d. Foods-Consumer Quality & Utilization
		e. Household Economics & Management
14	Economics of Marketing	a. Field Crops
		b. Fruits & Vegetables
		c. Livestock, Meats & Wool
		d. Dairy Products
		e. Poultry & Poultry Products
		f. Forest Products & Ornamental & Drug Plants
		g. Cross-Commodity & Functional Studies
15	Meteorology	Meteorology
16	Ornamental & Drug Plants	Ornamental & Drug Plants
17	Plant Pathology & Bacteriology	a. Plant Pathology, Botany, & Diseases of Miscellaneous Crops
		b. Diseases of Field Crops
		c. Diseases of Fruit Crops
		d. Diseases of Vegetable Crops
18	Plant Physiology & Nutrition	Plant Physiology & Nutrition
19	Poultry Industry	Poultry Industry
20	Rural Sociology	Rural Life Studies
21	Soils	a. Soil Chemistry & Microbiology
		b. Soil Fertility, Management & Soil-Plant Relationships
		c. Soil Physical Properties, Conservation & Classification
22	Vegetables	a. Vegetable Crops
		b. Potatoes
23	Veterinary Science	Veterinary Science
24	Weeds	Weed Control